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THE CATTLE INDUSTRY.

We print in this number a valuable and interesting paper on the existing conditions and possibilities of cattle raising on the savannah lands of the Colony. We hope, in an ensuing number, to reproduce articles, derived from the experiences of men who have devoted the major portion of their lives to such work, on the actual management of cattle on the Guiana savannahs from the point of view of beef production; also on the successful handling of a herd of dairy cows.

Little, if anything, has ever been written by men of real practical experience concerning these matters in British Guiana; much accumulated knowledge has thus been lost. There is no denying the fact that a future lies ahead of this industry and it is hoped that these series of articles may widely disseminate very necessary information which, to prospective setters should prove invaluable.

Never more than at the present time has the food problem been more acute, and this state of affairs will by no means as rapidly disappear as it has come about. Man is essentially a predaceous animal and fresh sources of beef production are for-ever being sought after ; we assert that seldom have better prospects existed for the raising of cattle than on the vast hinterland savannahs of British Guiana.

CATTLE RAISING ON CROWN LANDS IN BRITISH GUIANA.

JOHN MULLIN, Department of Lands and Mines.

Of recent years an increasingly large number of enquiries are being addressed to the Government by individuals and firms seeking information with regard to the possibilities of cattle raising in this Colony. These enquiries emanate in many cases from persons with practical experience in stock raising in the United Kingdom, Canada, South and East Africa, Australia and the United States of America who have a moderate amount of capital to invest and are, they state, influenced by climatic or other reasons literally to "seek pastures new" in a warm climate reasonably near to good markets, but free from the devastating cattle diseases which are thought by many to be a necessary feature of stock raising in the tropics. In other cases enquiries have been made by firms who are seemingly seeking in advance to prepare for the undoubted great wave of expansion in stock raising, which is bound to follow the war with its wholesale destruction of vast and valuable herds for food in the European Countries affected and which, owing to the ever contracting areas available for grazing in the Nortern Countries, will lead to further great developments in that direction in the Southern Continent of America.

The mention of the Southern Continent of America in connexion with Cattle Ranching, however, immediately conjures up in the minds of most people the vast pasture lands of the Argentine with their huge herds of oxen waiting to be converted into somebody's special brand of "meat extract." To those a trifle more informed, it may recall the fact that Brazil possesses vast areas of pasture land also, on which some millions of head of cattle are at present grazing. But to very few in this Empire of ours does it convey the knowledge that British Guiana possesses some three or four million acres of pasture land (known locally as "Savannah Country") immediately adjoining the northern pasture lands of Brazil and extending Northwards and Eastwards

to the middle West of the Colony and thence, with the exception of a forest belt (through which a cattle trail is now under construction) along the great Berbice-Demerara river divide to the Atlantic seaboard.

To many of our readers who have not access to the Colony's Departmental reports the following extract from the annual report of the Department of Lands and Mines for the year 1916, may prove interesting:—

"*Cattle Grazing.*—The demand for Crown lands for the
" purpose of grazing cattle is steadily increasing. It has, of
" course, been long known and thoroughly proved that British
" Guiana is eminently suited to the raising of cattle ; but until com-
" paratively recent years there has been no attempt to go in for
" systematic ranching, the reason being that practically every
" manager of a sugar estate possessed a fine herd of cattle which
" grazed on the abandoned or fallow lands of the estate and these
" herds provided ample supplies to meet local demands. With the
" growth of the rice industry, however, lands hitherto available for
" grazing have been taken up for rice and most of these herds have
" been broken up and purchased by small farmers—principally
" East Indians—who go in more for dairy business than for
" raising cattle for slaughter. This has naturally tended to
" create a shortage of beef cattle, which has been reflected in the
" increased prices of meat in recent years and, following the laws
" of supply and demand, has led to the formation of local com-
" panies for financing and carrying on cattle-ranching on modern
" business lines, with most encouraging results.

" Thanks to the admirable work of the Board of Agricul-
"ture and the hearty co-operation of the sugar planters in im-
" porting and distributing thoroughbred English and American
" stock, there are to-day many very fine herds of cattle to be seen
" in different parts of the Colony and prospective ranchers need
" anticipate no difficulty in procuring excellent cattle, thoroughly
" seasoned and well suited for the preliminary stocking of
" ranches.

" Whilst too much stress cannot be laid on the tremendous
" possibilities of the large savannahs in the hinterland of the

".Colony for cattle-raisng, it should not be imagined that Brttish " Guiana cannot become a large centre for cattle-rearing until " those savannahs are connected to the coast by railway communi- " cation. On the contrary there are very large areas of excellent " savannah land on the lower reaches of the navigable rivers of " the Colony which are highly suitable for ranching purposes and " which, being accessible to direct ocean steamer communication, " would permit of the erection of packing and canning factories " which could compete successfully in the local and West Indian " market against the present imported meats.

" Typical examples of these areas are the large, well-drained " and watered savannahs on the Berbice, Canje, Ituni, Vironje, " and Abary rivers, where hundreds of thousands of areas of " Crown land still await the rancher and it remains to be seen " whether these areas are to be exploited by foreign capital and " enterprise or whether the re-awakened interest in the Imperial " dominions as a field for investment after the War will lead to " the establishment by British concerns of ranches and packing " houses which will be formidable competitors of those at present " controlling the markets in these latitudes.

" During the year under review, two applications have been " filed for 99 year leases for cattle-grazing purposes over Crown " lands situate on the front lands of the Colony ; one area of a " little over 5,000 acres lying between the Mahaicony and " Mahaica rivers having been applied for by the newly-formed " Mahaicony Cattle Ranch Company, Limited, and the other " application being by Messrs. Gordon and Haly for a tract of " similar area between the Berbice and Abary rivers, immediate- " ly adjoining the Abary Cattle Ranch Company's holdings.

" Seven applications have been filed during the year for " cattle-grazing rights over blocks of 50 square miles each on the " left bank of the Ireng (or Mahu) river in the locality between " the Tumong and Echilebar rivers. This is a new district from " a ranching point of view, although cattle have been grazed there " by Indians for many years and if a suitable cattle track can be " traced from the Kaieteur Plateau to the Potaro valley, from " which point cattle could be conveyed to the Coast, this locality " might become a valuable source of supply.

"Two additional applications have been filed during the
" year for grazing rights over blocks of 50 square miles each on
" the Rupununi River. Cattle ranching on these savannahs
" continues to give most satisfactory results as regards natural in-
" crease and the quality of the animals raised. This vast region
" is only waiting the advent of a railway to ensure full realisation
" of its great potentialities, and it is hoped that the day is not far
" distant when the proposed railway from Georgetown to the
" Brazilian boundary, the course of which runs through the
" Rupununi District, will open it up for cattle raising and cotton
" growing on a scale commensurate with the enormous area of land
" which is available and suitable for these purposes."

The conditions under which Crown lands in British Guiana can presently be obtained for Cattle Grazing are very generous. Over lands on the "Hinterland Savannahs" extending from the Brazilian-boundary to the middle West of the Colony, "Cattle Grazing Permissions" are issued, each covering a 50 square mile block (10 miles by 5 miles) at a nominal annual charge of $15 (£3. 2s 6d). This Permission does not require the holder to fence the land, but carries with it the right to obtain a Ninety-nine year lease, if within 5 years from the date of issue of the Permission the holder shall have

(1) a corral of not less than 2,500 square yards in area, and

(2) a habitable house with a resident stockman, and.

(3) Five hundred head of cattle,

on the land covered by each permission. The Ninety-nine year lease carries a slightly higher rental, which at present is fixed at $2—(Eight and four pence) for every square mile, or $\frac{1}{3}$ of a cent (one-third of one half-penny) an acre; but the Government reserves the right in the event of Railway communication being established with the Coast to raise the rent to a sum not exceeding $5.—(One pound and ten pence) for every square mile, or a maximum of a little under $\frac{4}{5}$th of a cent an acre. This lease is modelled on the Australian laws and is designed to encourage and not to restrict the rancher.

Since the report of the Department of Lands and Mines was written, the Government have commenced to open a Cattle Trail to connect these middle West Savannahs with those running along the Berbice-Demerara river divide to the coast. The belt of forest separating these stretches of open country is approximately 120 miles across at the point chosen for the trail and the work of opening this trail, along which herds of cattle may be driven to a point from which they can be shipped into ocean going steamers or placed on the local market, is reported by the Commissoner of the District to be progressing most satisfactorily and with every prospect of complete success.

In regard to this scheme for the construction of a trail over which cattle may be driven from the hinterland savannahs to the coast, it is interesting to recall that, although he generally underrated the possibilities of the Savannahs on the British side of the Brazilian boundary, Sir Robert Schomburgk in his "Expedition into British Guayana" published in 1836 stated, "Nevertheless, "the savannahs may prove profitable to the enterprising colonist. "The herds of wild cattle and horses which graze on the "savannahs of the Rio Branco and its tributaries, the Tokio and "Maou, may be transported to the colony of British Guayana "where ready purchasers will be found."

"The best means of bringing them to the coast would be to "lead them across the savannahs and mountains to the foot of "Makarapan ; there are so far no difficulties to be surmounted ; "from thence it would be necessary to swim them across the "Rupunoony to its right shore, and for a second time across the "Essequibo from whence a path might be constructed to the vast "savannahs which extend between the rivers Demerara and Ber-"bice. The foot of the Makarapan Mountains might be reached "from the Brazilian fort San Joaquim in eight days, without im-"posing much upon men and horses. From the information I "have gathered, I know that the plains between Berbice and "Demerara are of great extent, but I am unable to point out the "direction in which they will be most easily reached."

It is entirely due to the pioneer enterprise of Mr. H. P. C. Melville, the present Commissioner of the Rupununi District, how-

ever, that the Savannahs on the British side have been proved so eminently suited to cattle ranching that to-day such a trail is in course of construction ; not, as foreshadowed by Schomburgk, for the purpose of conveying Brazilian cattle and horses to the coast, but as an outlet for the large and rapidly increasing herds of excellent cattle now grazing on our own savannahs, and it is on Mr. Melville's suggestion and under his direct supervision that the trail is being constructed.

The savannahs to the West of this forest belt and extending to the coast may be divided into two parts of almost equal areas (a) those situate on the low flat alluvial coast lands, which are exceedingly fertile ; but a great portion of which have, owing to their liabilty to become swampy in the wet seasons, to be empoldered and drained in whole or in part to ensure successful results and (b) those extending from the alluvial flat-lands back to the forest belt and forming undulating sandy downs, well drained and watered but not well grassed except in their more fertile saucer-like hollows. Though apparently not so suited to cattle ranching as the savannahs of the hinterland or the lush-grass flat lands of the coast these undulating downs should be better suited to sheep farming than the more swampy coast lands and as the price of mutton in the local market and those of the neighbouring Islands ranges from 36 cents (one and sixpence) a pound upwards there is a profitable field for the successful sheep farmer in this colony.

The yearly rent charged under Cattle Grazing Leases issued in respect of the Coastal Savannahs are somewhat higher than those charged for the Hinterland, being 10 cents (5d.) an acre. The lease also requires the holder to fence the land in places where the tract taken out adjoins other holdings and where there exist no natural boundaries, such as wide, streams, which render fencing unnecessary. Highly successful ranches have been established under these leases and the results obtained from cattle ranching on the coastlands are decidely good. There are exceptional possibilities for hog farming on a large scale on the coastlands also, as there is a huge market for pickled pork, hams and bacon, both in the colony, the West Indian Islands, and the neighbouring colonies of Dutch and French Guiana.

British Guiana is singularly free from many of the dangerous anmal diseases common to other Countries and has none which are peculiar to it. On the Hinterland Savannahs cattle disease is practically unknown and history records no epidemic of any kind. As regards the Coastlands one cannot do better than to quote the latest published remarks on the subject by the Director of Science and Agriculture, Professor J. B. Harrison, C.M.G. Writing in the Departments Annual Report in review of the year 1916 Professor Harrison says, " During the year 1916 the general health " of the live stock in the colony has been excellent. The only " outbreaks of contagious or infectious disease were two of anthrax " and two of swine fever both of which were very soon brought " under control. There have not been any deaths among mules " from anthrax for over two years ; this is attributable to the fact " that importers of mules now have their animals inoculated against " anthax as the mules are landed. All mules on sugar estates are " so inoculated annually. Outbreaks of anthrax among cattle " occurred at six places and were attended by 34 deaths. Cattle-" owners do not appear to realise the advantages of protecting the " animals against anthrax. There were not any cases in the " Colony of glanders, cerebo-spinal meningitis, contagious pleuro-" pneumonia or mal de caderas during the year."

There is established in the Colony a Board of Agriculture on which representatives of all the principal agricultural and stock-raising industries have a seat and which has legislative power to deal promptly with any outbreaks which may threaten live stock or agriculture generally. How local are the small outbreaks, which occur from time to time in this Colony, as elsewhere amongst stock, and how promptly action is taken to eradicate them may be guaged from the report of the Government Veterinary Surgeon in reference to the cases of anthrax referred to by Professor Harrison. Writing on August 10th 1917 he says. " In connection " with the outbreak of anthrax in two places, viz., Pln. Vryheid's " Lust and Chateau Margot on the East Coast, Professor Harri-" son and myself went up and investigated. On certain enquiries " we found that in each place the deaths occurred in a small " pasture of about 10 acres each. Instead of quarantining the " whole estate as has been formerly done, we quarantined the " two pastures and asked the estates' authorities to fence them in

"which they at once did. I then had all the cattle that were
"kept in these pastures vaccinated and kept inside the fence for
"twenty-one days. They were then turned out and the gates
"locked and the pastures flooded. No cases have occurred on
"either estate since and this was done over eighteen months ago."

There is a Government Biologist on the Staff of the Department of Science and Agriculture by whom all animal parasites whch may affect cattle in any way are carefully studied and the necessary remedial measures promulgated and there is a Government Bacteriologist attached to the Medical Staff of the Colony whose services have been utilised to advantage in conjunction with the work of the Veterinary Department in identifying blood organisms in disease.

The latest returns give the estimated heads of stock in the Colony as follows :—

Cattle	125,000	Mules	2,100
Sheep	22,000	Donkeys	6,000
Pigs	12,000	Buffaloes	360
Horses	1,300	Goats	13,500

The climate of British Guiana is a delightful one and not at all of the character associated with the "Tropics," which are unfortunately connected in the minds of the average untravelled person with scorching heat and all the deadly fevers of the remotest African jungles. The minimum and maximum temperatures in the shade range from 79 degrees to 87 degrees F. on the Coastlands, and 73 degrees to 92 degrees F. on the Hinterland Savannahs. The Sun however is hardly ever fierce enough to be dangerous and sunstroke is practically unknown, whilst here, as in more temperate countries, the healthiest man is the dweller in the open—the man who is in the saddle or a-foot from sunrise to sunset. In fact it is "summer all the time" in British Guiana and even in the wettest months the sunshine does not desert us for more than a few hours at a time. Stock can roam in the open all the year round and shelters are unnecessary, whilst the life of the rancher is as healthy and happy a one as a delightful climate and freedom from rush and anxiety can combine to make it ; for British Guiana is the land of "Never Worry."

BEE-KEEPING IN BRITISH GUIANA.

By P. M. De Weever, Onderneeming Industrial School.

In these days of costly living and scarcity of foodstuffs consideration should certainly be given to any additional source of income or to any other avenue other than those we now possess from which can be drawn further supplies of food. Bee-keeping can furnish such an additional source to a large number of the inhabitants of this Colony. It is not known with any degree of certainty when Italian bees were first introduced into Brtiish Guiana. It is, however, certain that spasmodic efforts at bee-keeping have existed for a number of years past both in the towns as well as in the country districts. Very few persons have seriously attempted to cultivate bees as a business proposition. To the farmer the advantages of having bees are numerous. In the exercise of gathering nectar and pollen, bees fertilize flowers, the orange blossom is thus fertilized likewise coffee and those of the coconut.

The food value of honey is universally acknowledged. The stimulating effect of honey is even greater and more lasting than that of sugar cane. As a food honey is superior to sugar ; it is more digestible and contains a flavour and an aroma which appeal to the palate. When a farmer uses honey from his hives to sweeten his food he can guarantee that he is using a clean and wholesome form of nourishment ; this guarantee is impossible when he uses sugar from his grocer. Honey can be kept a long time without spoiling provided the vessels in which it is stored are perfectly clean and free from moisture.

FIRST PRINCIPLES.

To start bee-keeping it is best to begin with one hive, and as experience is gained the number can be increased until as many hives are procured as the beginner can conveniently manage.

Secure your hive locally if you can. If this cannot be done then the beginner can order the following outfit:—

1 Colony in ten-frame dovetailed hive	$ 9.00
1 Southern-bred Italian Queen, selected untested	3.00
1 Smoker	.55
1 Nickel-steel hive tool	.40
1 Root bee veil No. 2	.60
1 Bee brush	.15
1 pair Bee gloves	.50
1 Birmingham uncapping knife	.60
1 10-frame queen excluder (wood-zinc)	.42
1 Spun wire embedder	.25
1 Extractor No. 4	10.00
1 copy "Fifty years among the Bees" By Dr. C. C. Meller	1.00
	$ 26.47

The above prices are taken from an up to date American catalogue.

Having secured a standard hive as a pattern no difficulty will be experienced in making others. A selected, untested queen is to be preferred to any other. Her strain is guaranteed yet she has not in part exhausted herself in supplying brood as will be the case with a tested queen. On the other hand an untested queen may prove to be barren or she may develop the habit of laying drone eggs instead of producng workers ; in which case the beginner will only have the melancholy satisfaction of cursing his ill-luck. A smoker and veil are necessities. Bees must sooner or later be smoked; for they sting, and smoke is the only medium to quieten them. There are times when the experienced bee-keeper may go with impunity among his bees, and do to them just as he likes. At other times, in the midst of the utmost friendliness, and on the slightest provocation, without the least warning, vicious attempts may be made to change his appearance either by raising a bump on his forehead, increasing the size of an ear, or closing one eye.

A bee brush is necessary. By this useful implement bees can, without injury to their keeper or themselves, be removed from covers to frames. Gloves protect the hand from stings, and an uncapping knife prevents loss of comb and honey.

The queen excluder is used when the bees show signs of being ready to store honey, after having made provision for the feeding of the queen and young broods. This readiness is seen when they begin to seal cells containing honey. The queen excluder should then be put on, and on top of this another hive, the "super," containing frames with full sheets of foundation. At the sight of the excluder the workers will rush upwards through the opening to the super and will begin to work. As the queen is larger than the worker, she will be kept in the hive below, which will now become the brood-chamber. In this chamber the queen will continue to lay eggs and young bees will be reared, whilst honey will be stored in the super. If the super is not put on at the right time the bees may run all over the foundation without working, and it is very difficult to induce them to do so when they have once made up their minds not to work upstairs. If bees will not work in the super, take about two or three combs from the brood-chamber which may be free from brood, but contain honey, and place these in the super, removing frames with foundation only. Put the empty frames in place of the filled ones which have been removed. In nine cases out of ten they will start working with energy. The wire embedder in the list is used to fasten the foundation on to the wire stretched across the frame.

It is necessary for the tyro or even the experienced bee-keeper to have a work of reference on bees. "Fifty years among the bees" is the accumulated experience of one of the best and most practical of American bee-keepers. But for comprehensiveness of matter few publications on bees can be placed beside "A.B.C. and X.Y.Z. of Bee Culture" published by the A. I. Root Co. at $2.00 per copy.

POSITION OF HIVE AND ENEMIES.

A hive should be placed with its entrance towards the East, and should be somewhat protected from the noon-day heat ; its situation should be such that, whilst receiving the direct rays of the

morning and afternoon sun, its sheltered position would shade it from sudden gusts of wind. The ideal position is under a large tree whose branches have been trimmed high up, and where a house or a belt of trees eastward affords the necessary shelter from the wind. The hive should be placed on a stand 20 or 24 inches from the ground as a protection against crapauds which, gastronomically speaking, are great lovers of bees.

It is important that an apiary be occasionally visited at nights. The so-called Tarantula* spider makes its depredations after night fall, and the "Yakman"† ant attacks after a shower as soon as the evening sets in. But of all the enemies of the honey-bee in this Colony the most to be dreaded is the "Yakman." For days previous to an attack these depredators will be seen gathering their forces and storing them at convenient centres, either under the hive, in the grass near by, or in holes at the base of a tree. When the time for action comes, the ground near the apiary will literally be alive with ants, and these will begin to swarm up the legs of the stand. Those "Yakmans" which have been in hiding under the hive will then sally forth to head the attack. One ant will attempt to enter the hive, and he will immediately be stopped by a guard, and the battle will begin. This particular Yakman is soon stung to death by a bee, but before the bee can recover another Yakman will run up behind and sting to death. In triumph two other Yakmans will rush him, each seizing a wing; a dead bee will then be carried off and stored in some convenient place nearby. And now the whole force of Yakmans have joined in the battle. They rush the bees, and after hours of fighting the bees, driven farther and father from the entrance, are ultimately seen in a great heap surrounding the queen. They neither give nor ask for quarters. They deal deathblows around them until, overpowered by sheer weight of numbers, they die defending their queen.

AN ATTACK OF YAKMAN ANTS.

At Onderneeming two hives are placed aback near the coffee cultivation for the purpose of increasing the productiveness

**Avicularia avicularia. L.*

†Eciton burchelli. Westw.

of the trees. A few years ago a determined and vicious attack was made upon these hives by a large colony of Yakman ants, When the writer arrived not a bee was to be seen. As a protection against such an attack the legs of the stand were tarred and receptacles containing tar were permanently attached. At the time of the attack the tar was still wet and the receptacles full. But the Yakmans overcame these difficulties. A large number of them sacrificed their lives in an endeavour, which succeeded, to climb one of the legs of the stand, thus affording a safe footing to others. The Yakmans were to be seen climbing in to the hives. As this pathway afforded only a safe footing for ants in single file, and not for two laden with a bee between them, a festoon of many thousands of ants was made from the top of the stand to the ground, and by this ladder the laden ants travelled downwards with their loads of lifeless bees, one bee between four ants. Meanwhile the approaches of the hives were guarded by large white-headed Yakmans.

The writer and his assistant began the attack on the depredators by building a fire to windward of the hives and putting on it some green grass and leaves. The smoke thus generated was driven by the wind towards the entrances, and soon a great commotion took place among the crowd of invaders. The festoon suddenly dropped to the ground and thousands of Yakmans made desperate efforts to leave the hive. We then surrounded these with a ring of fire, and the ants, as they rushed to obtain safety, were killed in droves. When the fire died down, the remaining bees were placed in a fresh box, and fed with syrup. During the whole of the fight a large number of bees had clustered around their queen, and thus had shielded her from harm.

Coushi ants‡ do not trouble bees. They are vegetarian in their habits, living upon a kind of fungus they grow in their nests upon vegetable matter gathered from living plants. The Yakman, on the other hand, is insectivorous, feeding on the dead bodies of insects which it searches out and kills for the purpose.

‡*Atta cephalotes. L.*

ROBBERY AND ITS DETECTION.

Bees rob each other and thus cause great loss to the bee-keeper. When a colony, from any cause, has become weak, its neighbours soon find this out and, if given the chance, will start robbing the unfortunate hive. The best remedy is a contraction of the entrance of the weak colony to a passage of about one or two bee spaces. If the robbing is bad, removing the robbed colony to another part of the premises at night time, or putting wet grass in front of the entrance after contracting it, as previously described, will, in most cases, put an end to the evil. This habit of robbing weaker colonies has been the chief cause of all the trouble with bees in this colony.

It is important that the beginner should know when his hive is beng robbed by his neighbouring bees. In looking at the entrance of a colony of bees, if any are observed first to leisurely walk about in front of the hive, then gradually to make their way into the entrance, you may be assured that you were watching the manoeuvres of a robber. Continue to look and if you find a bee climb up some distance in front of your hive before flying off it is certainly a robber, for these fellows being laden with honey must climb some distance before taking flight so as to prevent their falling to the ground. Working bees of a hive, when they arrive laden with honey or pollen, rush at once for the entrance and disappear inwards in a great hurry. Robbers linger on the alighting board before leisurely walking in. Members of a hive in leaving, briskly come out, and with one spring fly upwards, and away to the honey field. A robbers flight is first downwards, then, flying upwards makes a semicircle for his own abode.

After a hive has been weakened by robbers the inhabitants become demoralised and so give an opportunity to the bee-moth* who is forever on the look out for such chances. Should a colony be attacked by this pest, the entrance to the hive must be contracted and the bees fed. The badly infected combs should be melted

Galleria melonella. Linn. *See Journal of the Board of Agriculture. Vol. VI. No. 12.*

down and fresh ones put in their places. The other infected combs may be put in strong colonies to be cleaned, one comb at a time in each. The feeding is better done inside the hive, the trough being let down either at one of the sides or in the centre, two or three frames having been removed for the purpose. A good feeding trough can be made of hard wood 6 or 8 inches long, 4 inches broad and ¾ inch deep, with 3 grooves for the syrup each ½ inch. The syrup is made by mixing sugar with boiling water the sugar being gradually poured into the water whilst boiling until all the sugar has dissolved in the proportion of 1 lb of sugar to 1 pint of water. When cool, feed morning and evening. The feeding trough may also be used as a means of contracting the entrance to the hive if made longer, by placing it outside the hive on the alighting board, close to the entrance. It might be thought that better feeding can be done with honey if an abundance is near at hand rather than go to the expense and trouble of making syrup ; but to feed bees with honey will be false economy. Bees fed on honey will in all probability become lazy, developing depredatory propensities and refusing to gather nectar to manufacture food for themselves. When the colony has become so strong that the feeding is stopped the bees develop the most vicious tendency to rob others. They become a band of thieves and rob their neighbours at the slightest provocation and without the least compunction of conscience.

BEE DISEASES.

Bees suffer from several kinds of diseases the worst of which is ' foul brood.' This, however, is not as prevalent in the colony as in colder climates but Italian bees may exhibit signs of paralysis. The first indication which points to a colony having paralysis is that a few bees may be seen with swollen abdomens running from the entrance and in other respects having a greasy appearance. When this is observed all bees should be brushed off the frames which contain unsealed brood and be given to nuclei or to hives, one frame to each, and the bees dusted with sulphur, fresh combs being supplied them. In about two weeks the colony will recover. If this plan does not succeed then the queen should be killed and the entire colony destroyed, for paralysis is infectious

and in a short time the disease will spread over the entire apiary.

Dysentry may be detected by the bees covering the entrance to to their hives with an evil smelling yellowish substance. This disease is caused by the bees, from some cause or other, consuming unripe honey gathered from certain flowers. The reason why they gather such honey is because the bee-keeper extracts honey from the brood-chamber, either when there is a scarcity of flowers, or during the rainy season. Under ordinary circumstances honey should never be taken from the brood-chamber if this can possibly be avoided. Should a hive be unfortunate enough to contract dysentery the bees should be brushed on to clean frames which have a good supply of honey and be given a fresh box. The old combs and box must be disinfected by spraying them with a strong solution of salt and water. These combs should never be given to the bees again but be melted down for wax.

THE BEE COLONY.

Some writers on bees say in effect—

> " How doth the little busy bee
> Improve each shining minute.
> From neighbour's fields his stock he steals
> That's why there's money in it."

At times the bee can be as great a loafer as any village labourer. Like him she will only work when the larder is empty. The moment all her cells are filled with honey she stops working and thinks only of marrying and being given in marriage.

In a hive there are three kinds of bees, the Queen, the Worker and the Drone. Very seldom are two queens found in one hive, and when this is the case, on examination, one will be found to be old, laying very few worker eggs. A queen lives from one to three years and during this period she lays all the eggs that hatch into workers. When insufficiently fertilized she will at time-lay eggs that develop into drones. In three days an egg will hatch, and the larva which emerges is fed for six days with a white substance manufactured for the purpose. After this period of nursing, the cell is sealed, and in about 12 days the perfect insect emerges.

When a young queen leaves her cell she roams about the hive for about three days, challenging to mortal combat any other young queen ; for the workers in making provision for supplying a new queen, always build several queen cells in different parts of the hive The queen which always hatches first seeks out the others, and a fight to death ensues. The one which should succeed in killing the other reigns. The workers gather around her, attend her wants and make arrangements for her matrimonial flight

Early one bright morning the victorious queen leaves the hive followed by a large retinue of bees which fly in a series of circles around her. Soon after drones fly in pursuit with a loud buzzing noise making straight for the queen and she, after a series of evasions ultimately yields to the overtures of one of her admirers. The queen is now fertilized for the term of her natural existence and can become the mother of many generations of bees. This mating takes place after a large gathering of honey. Before leaving the hive for the matrimonial flight the bees fill their honey bags with a supply of honey to last them for about three days. If the hive is queenless, the whole party returns to the original home ; if an old queen is left the swarm alights on the limb of a tree, forming a cone with its apex pointing downwards, and remains there until the searchers sent out to find a hollow tree or some other crevice return. Often the searchers efforts are fruitless and combs are then built where the swarm had first settled. These combs hang perpendicular with horizontal cells, cylindrical in shape, and slant slightly upwards from the centre.

The drone is broader and thicker than either the worker or the queen and flies more swiftly than either of them. He has no sting and is a great consumer of honey. His only duty is to fertilize the queen. When the queen is fertilized the remaining drones are killed.

The worker is an undeveloped queen. It lays drone eggs when a swarm is to be cast off. Workers gather honey, make wax, build combs, remove the sick, dying and dead from the hive, and do everything else necessary for the proper upkeep of the colony except laying eggs to produce queens or workers. When

flowers are scarce, the food supply low, and when, on account of the strength of other colonies, no robbing can be done, the workers of a crowded hive kill their queen. If the conditions improve some of the larvae are fed with 'royal jelly' to produce queens. Should the scarcity of nectar persist until all the brood are hatched, the colony, in spite of regular feeding dies out. Whenever a colony is found to be queenless or without brood the only thing to be done is to transfer the bees to another colony.

THE FLAVOUR OF HONEY.

Bees gather honey from a variety of flowers; and each variety gives the hoeny its peculiar flavour and aroma. The Courida (*Avicennia nitida*) gives a white, thin honey which has its colour as its chief recommendation. The honey from the Hog-Plum (*Spondias lutea*) is of an amber colour with a distinctly acid taste. The aroma of the Bat-Seed (*Andira inermis*) honey is very pleasant and the colour light amber. The Long John (*Triplaris surinamensis*) gives a thin, clear honey with no distinctive flavour whilst the honey from the mango (*Mangifera indica*) is thick and sugary. Of all the honey producing plants within the experience of the writer that from the coffee is best. It has an aroma which, when once experienced, is always preferred. There is a fine blending of essences, so to speak, and the honey is very stimulating to one after a hard day's work. The wild ipecacuanha (*Asclepias curassiva*) produces honey which is bitterish in taste, dark and thick. Besides flowers, bees kept about Georgetown gather honey from sugar bags in the stores ; but the honey from this source has no distinctive flavour or aroma.

LOCAL WILD BEES.

There are several kinds †of honey bees indigenous to the Colony, and they are, for the most part, stingless. It is not generally known whether they have been systematically studied. The best known of these are the 'tar baby*' a small black bee, and the 'water-cow.'‡ The 'tar baby' is easily domesticated

†*See Journal of the Board of Agriculture Vol. VII. No. 2 p. 76.*

**The scientific name of the "Tar baby" bee is Melipona clavipes F.*

‡*Species unknown to me. Editor.*

but the amount of honey gathered in the course of a year is small, acid in taste, and does not keep well. The 'water-cow' on the other hand, is a large bee with pale yellow bands, and may easily be mistaken for the Italian. When one of its hives is invaded a large quantity of good honey is got which is pleasant to taste. It is not known whether they have ever been domesticated.

A NOTE ON THE RECENT FROGHOPPER OUTBREAK.

By G. E. Bodkin, B.A., Dip. Agric. (Cantab). F.Z.S., F.E.S. Government Economic Biologist.

The Demerara Sugarcane froghopper (*Tomaspis flavilatera Urich**) has, during recent months, increased enormously in numbers in three widely separated districts, namely the Essequebo Coast, East Bank Demerara River, and in the vicinity of the Mahaica Creek, East Coast Demerara. To my knowledge, in two of these areas, this species of Cercopid previously existed, but it was always a difficult matter to locate them. I have little doubt that this insect has been present on every sugar estate in the Colony for many years.

The reason for the sudden increase has been mainly abnormal climatic conditions; in every case the history has been the same. Continued heavy downpours of rain have caused the soil to become waterlogged and the canes became backward and even stunted. The use of Nitrate of Soda as a fertilizer aggravated these conditions. In reality the diseased, blighted and backward appearance of the canes within the affected areas was not due entirely to froghopper. Adverse weather conditions were primarily the causative factor ; the pest took advantage of the extremely favourable conditions, multiplied accordingly, and put the finishing touch, as it were, to the already weakened plants.

These circumstances however must not detract from the fact that our local froghopper, hitherto regarded as being a casual

**Urich F. W. The Bulletin of Entomological Research. Vol. V. Part I. Page 43. April 1914.*

visitor to the canefields, has demonstrated that it is perfectly capable of doing immense damage. It is therefore quite plain that every effort must be made, while we still have the opportunity, to reduce the pest and keep it within its former status. It is hardly necessary for me to refer to the huge sums of money that have been expended in controlling—or perhaps better, trying to control—the giant moth borer and the small moth borer ; where a step in time would have indeed saved much.

In two cases of froghopper outbreak the canes had gone beyond repair and I advocated thorough flooding after total destruction, by fire or otherwise, of the trash. In Essequebo, where the attack was heaviest, every stool of cane contained fully a hundred nymphs enveloped in the characteristic spittle-like froth. A few days previously swarms of the adult insect had invaded houses in the district being attracted thence at night by the powerful artificial lights.

Good results have been obtained by a gang of children armed with nets who, during the daytime, ranged over the canefields and captured many hundreds of the adults. Traplights, placed at the most convenient height, and equipped with a powerful light should do good execution. I am also attempting to give the Green Muscardine fungus,† a trial here.

In conclusion it should be clearly stated that the species with which we are concerned is not the destructive Trinidad species which is quite distinct in appearance from our species.

Rorer. J.B. The Green Muscardine Fungus and its use in canefields. Circular No. 8 Board of Agriculture, Trinidad and Tobago.

BOTANICAL IDENTIFICATIONS OF BRITISH GUIANA TREES AND PLANTS.

By L. S. Hohenkerk, Forestry Officer, Department of Lands and Mines.

During 1914 the late Forestry Officer, Mr. C. Wilgress Anderson, I.S.O., took with him to the Herbarium of the Kew Royal Gardens, London, a large number of botanical specimens which had been collected during his forest inspections extending from 1908 to that date, and there made a preliminary classification of these specimens while on leave of absence.

The final determination, however, was left to the experts at Kew and some of the identification lists have now been received. Their publication in the British Guiana Board of Agriculture Journal was decided upon as affording the best means of distributing the information to local botanists and others interested in the subject, and the remainder of the lists, as they are received, will be similarly published.

The various species have been brought together in the following list under thier natural orders which have been arranged alphabetically ; the place of collection and a short description of the tree or plant have been added from the original notes. The vernacular names given are chiefly those of the Arawak Indians. Abbreviations used in the text are as follows:—

R. or Riv. for River ; ck. for creek ; Dem. for Demerara ; Esse. for Essequebo ; Maz. for Mazaruni ; Pom. for Pomeroon; N.W.D for North Western District ; H.M.P.S. for H.M. Penal Settlement ; Savan. for Savannah ; dia. for diameter. Mainap means areas covered with young or old second growth forest.

A list of trees and plants of British Guiana which have been botanically identified at Kew from specimens collected by the Forestry Officer.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918
	ACANTHACEAE.			
310	Nameless shrub	Issororo, Aruka R.	Shrub on river bank, red flowers.	*Aphelandra pectinata*, Willd.
	ALISMACEAE (Monocotyledon)			
263	Nameless shrub	Sand beach. Arawari ck., Esse. R.	Shrub or plant, has latex.	*Sagitaria lancifolia*, L.
	ANONACEAE.			
35A 35B	Black Yarriyarri, Hill	Aruka R., N.W.D. Gravel ck., N.W.D.	A tree; yellow, medium hardwood. Used for fish rods.	*Anaxagorea brevipes*. Benth.
389	Black Yarriyarri, Hill	Issororo, Aruka, N.W.D.	A tree.	*Unonopsis Andersonii*, Sprague, n sp.
452	Vogel Kop, Fogel Kop or Yudibutshi	Chimisi Karakara ck. Dem. River.	Tree, yellow hard wood, slight aromatic odour.	*Guatteria Schomburgkiana*, Mart. (Note:—See also Nos. 171 & 465 under Sapotaceoe, *Sideroxylon* sp.)
120	Karemero, Black Kuyama	Mt. Terminus, N.W.D.	Tree about 8"dia. Soft light yellow wood.	*Guatteria Ouregon*, Dunal.
118A	Koyetchi or Black Maho	Mt. Terminus, N.W.D.	Tree about 10" dia. white, soft wood.	***Rollinia sp.***
118B C D	Koyetchi or Black Maho.	Issororo, Aruka, N.W.D. Kabakaburi, Pom. River Fort Island Esse. R.	do. do.	***Rollinia multiflora***, Splitg.
	APOCYNACEAE.			
334	Funtumia Rubber, (cultivat-	Onderneeming Esse. R.	A tree, producing rub-	*Funtumia elastica*, Stapf.

D.L.M. Record No.	Vernacular name	Where Collected	Descriptior	Final determination at Kew from lists supplied in 1918
	APOCYNACEAE. continued			
13	Hill Mabua	Issororo, Aruka, N.W.D.	Tree 10-12" dia. white brittle wood. Scaly, thick, whitish-grey bark, yields much latex.	*Plumeria articulata*, Vahl.
145	do.	Santa, Kamuni, Dem. R.	Tree about 16" dia. Yellow medium hard wood. Rough, scaly, medium thick, dark brown bark, yields white sticky latex.	*Plumeria sp. nov.*, near *P. sucuuba*, Spruce
102	Yarura or Paddle wood	Bonasika, Esse. River.	Large tree, with fluted trunk. Has white latex.	*Aspidosperma sp.* (No flowers.)
337	Nameless tree	Path between Capoey & Tapakuma Lakes, Esse.	Large tree, fruit with wingedseeds	*Aspidosperma sp.* (No flowers).
125	Siba-danni	Kamuni R., Dem. R.	Large tree.	*Aspidosperma sp.* (No flowers)
445	Buri, much the same as 455,	Bank of Manabadin R., Dem. R.	Small tree, pale yellow flowers.	*Tabernaemontana sp.* (Not matched)
455	Dog stones. Peru-ishi-lukudu or Dog stones also Tanta-ran-tang.	Christianburg, Dem. R. Plentiful	A shrub, name from shape of fruit. White sticky latex.	*Bonafusia undulata*, H.D.C.
304	Nameless tree.	Supenaam R., Esse.	A small tree	*Malonetia sp.* (very near *Malonetia reflexa*, Mull. Arg.)
149	White Haia-	Kamuni River, Dem. R.	Soft, light yellow, sap-wood tree, about 12" dia. Used for making matches. Thin bark, abundant thin, sticky latex.	*Malonetia obtusiloba*, A.D.C.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918.
60	Kirikihi or Firewood	Aruka, R., N.W.D.	A small tree Wood used by Indians for obtaining fire by friction. Yellow flower with purplish stripe.	*Malonetia obtusiloba*, A.D.C.
454	Makuriru	Christianburg, Dem. R.	A small tree	*Ambelania sp.*
95 230	*Echites biflora*	Bonasika Riv. Esse. R.	A vine covering bushes on river banks	*Rhabdadenia biflora*, Mull. Arg.
83	Nameless climber	Bonasika Riv. Esse. R.	A climber on a Melastomaceae.	*Condylocarpon Ramvolfiae*, Mull. Arg.
316	Nameless vine	— Upper Pom. River	A vine near river.	*Condylocarpon intermedium*, Mull. Arg.
322	do.	— Upper Pom. River	Vine with yellow flowers.	*Odontodenia grandiflora*, Miers.
394	Kamuru vine	— Courantyne River	A vine, plentiful on river banks. used for unt slings yields rubber.	*Odontodenia speciosa*, Benth.
	BIGNONIACEAE.			
217	Nameless climber	Near Morawhanna, N.W.D.	Climber Pink flowers	*Schlegelia lilacina* Miq.
489	Bultata-kubia	Christianburg, Dem. R.	—	*Schlegelia parasitica*, Sw.?
	BORAGINEAE.			
66 259	Ants plant	Bonasika Riv. Esse. R. H.M.P. Settlement, Maz. R.	Tree 12 ft. high in which Kurabelli ants live.	*Cordia nodosa*, Lam.
103	Yuwanarow.	Kaituma, etc., N.W.D.	High tree 9" dia. Soft white wood, slightly darker heart	*Cordia Scabrifol* A.D.C.

D.L.M. Record No.	Vernacular Name	Where Collected.	Description.	Final determination at Kew from lists supplied in 1918
	CHRYSOBALANACEAE.			
232	Fat Pork or Kulimiro	Kaituma, N.W.D.	A small tree lining river bank adjacent to savannah.	*Chrysobalanus Icaco*, L.
177	Waracabradanni or Fat Pork	H.M.P. Settlement, Maz. R.	A small spreading tree, hard wood, 4" dia. used for torches. Fruit edible.	*Hirtella paniculata*, Vahl.
	COMPOSITAE.			
67	Kunami or Conami	Indian Settlement.	A shrub. Ground up and made into pellets for poisoning fish.	*Clibadium vargarii*, D.C.
264	Bitter Talli	? (Common)	A shrub. Used as a poultice for ulcers. White flowers.	*Mikania amara* Willd.
	CONVOLVULACEAE.			
224	Nameless vine	Bonasika Riv. Esse. R.	A vine	*Ipomoea demerariana*, *Choisy*.
	CYCLANTHACEAE.	(Monocotyledon)		
255	Nameless Palm	Kamuni River, Dem. R.	A climbing palm	*Carludovica sp.*
215	Mamuri Palm.	Barima R. N.W.D.	do.	*Carludovica.*
	GYPERACEAE	(Monocotyledon)		
233	Razor Grass	Kaituma River, N.W.D.	From swamp savan	*Rynchospora gigantea*, Link.
509	Dara-shiri (Bell Bird's beak).	Kara-kara ck., Dem. R.	Grass common on Savan: point of blade	*Lagenocarpus Mantii* Nees ?

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918
	EBENACEAE.			
109 222 483	Bara-bara	Issororo, Pom. R. Anabisi, Kaituma; N.W.D. Kara-kara ck., Dem. R.	A tree about 10″ dia. Hard yellow wood Thin, dark greyish bark covered with excrecences.	*Diospyros Paralea*, Stend.
402	do.	Lana ck., Courantyne R.	Tree, differs from Nos. 109 & 222 in size of flowers and leaves.	*Diospyros sp.*
	EUPHORBIACEAE.			
21	Sapium or Mabua	Aruka R., N.W.D.	A tree, fairly soft white wood. Found on hill and in swamp. Yields rubber.	*Sapium cladogyne*, Hutchinson.
5 5A	do do	Issororo Hill, Aruka, N.W.D.	A tree, very soft whitish wood. Grows on hill. Latex sticky.	*Sapium paucinervium*, Hemsl.
M.16		Rupununi District?	—	*Sapium prunifolium*, Kl.
285	Hatti or Sibi-sibi	Agatash, Esse. R.	A tree plentiful in Esse. River and other places. Yields latex.	*Hevea Confusa* Hemsl.
43 43 384	Suradanni	Amakura R., N.W.D. Bonasika Riv. Esse. R.	Large tree, dark red heart, pink to brown sapwood.	*Hieronyma laxiflora*, Mull. Arg.
219	Kunaparu	Aruka R., N. W.D. Issororo, Aruka, N.W.D.	Small tree. Leaves pounded in water used	*Phyllanthus piscatorum*, H. B. & K.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918.
408	(Square wood) Nameless tree.	Manakobi, Courant R.	A tree with square shaped trunk.	*Discocarpus essequeboensis*, Klotzich.
464	Nameless tree.	Kara-kara ck., Dem. R.	Small tree 6" dia. grows in mainap.	*Conceveiba guianensis*, Aubl.
311	Nameless bush	— Pom. R.	High straggling shrub in mainap. Said to itch if touched.	*Solanum asperum* Vahl.
	FILICINEAE.			
200	Fern	Upper Kaituma R., N.W.D.	Growing along banks of stream .	*Aspidium martinicense*, Spr. (*Nephrodium macrophyllum*, Baker.)
	GENTIANACEAE.			
296	Nameless plant	Hill foot, Makauria R. Esse. R.	Small plant white in colour.	*Vogria nivea*, Miq
	GESNERIACEAE.			
220	Namless Vine.	Banks of Kaituma R., N.W.D.	A vine. Flowers light canary with brown streaks.	*Gesneriaceae*
	GUTTIFERAE.			
282	Himirimia-balli or Black Heart	Santa, Kamuni, Dem. R.	Large tree with black heart wood. (Leaves and buds sent.)	New genus probably. (near *Quiini*. More material desired in order the plant may be worked out.
110	Kurahara	Kaituma R., N.W.D.	Large tree grows to 2" dia. or more Fairly hard, cross-grained wood. Used for making corials. Has greenish yellow, sticky gum.	(Guttiferae?)

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918
	HERNANDIACEAE.			
12	Takariwa or Jack-in-the-box, or *Hua-hua*	Aruka R., N.W.D. *Fort Isld.*, Esse. R.	Tree, grows to over 2 ft. dia. Very soft light, white wood	*Hermandia kujanensis*, Aubl.
	LAURACEAE.			
48	Yellow Silverballi	Kamuni River Dem. R.	Tree about 8" dia. roots above ground. Hard, yellow, fine grain wood with black heart, pleasant aromatic odour. Large fruit in capsule and larger leaf.	*Aniba Jenmani*, Mez.
48	Yellow Silverballi	Amakura Riv. N.W.D.	Small fruit and leaves.	*Aniba sp.*
162	Yellow Silverballi	Bonasika R., Esse. R.	Grows to very large tree, often hollow. Medium hard wood; Sapwood yellow turning reddish on exposure; heartwood green coloured and hard.	cf. *Persea nivea*, Mez.
86	Mainap or Yellow Silverballi	Bonasika R., Esse. R.	Tree on river bank. Bunches of small white flowers.	*Nectandra globosa*, Mez.
236	Shirua or Sirua	Karakara ck., Dem. R.	A tree; differs from No. 86. Narrow venation in leaves.	*Nectandra globosa*, Mez.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918.
368	White Silverballi. ?	Kaituma Riv., N.W.D.	A tree; resembles No. 86 Mainap. Different from No. 10 Bouragie or White.	*Nectandra globosa*, Mez. var.
388	Silverballi called Keriti	Issororo, Aruka, N.W.D.	Tree similar to Nos. 86 & 236.	*Nectandra Pichurim*, Mez.
484	Bouragie or White Silverballi	Christianburg, Dem. R.	Tree; different from No. 10.	*Nectandra Pichurim*, Mez.
10	Bouragie or White Silverballi	Upper Aruka R N.W.D.	Tree, squares up to 12 ins. Medium hard stringy white wood.	*Ocotea acutangula*, Mez.
169	Silverballi called Keriti	H.M.P. Settlement, Maz. R.	Tree grows to 19" dia. Pale, whitish yellow, Silvery, sapwood, small rker heart.	*Ocotea sp.* near *O. fasciculata*, Mez.
30	Brown Silverballi	Aruka R., N.W.D.	Tree. Yellowish green wood.	*Ocotea sp.* or *Nectandra sp.*
7	Greenheart or Bibiru	Hobo Hill, Aruka, N.W.D.	Tree, grows to large size, well known. Wood used for wharf piles, in shipbuilding & other constructional work.	*Ocotea Rodiei*, Mez.

(To be Continued.)

THE AGRICULTURAL DEVELOPMENT OF THE NORTH WESTERN DISTRICT, DURING THE YEARS 1907-1918

By A. A. Abraham, Senior Agricultural Instructor.

The North Western district embraces an area of 4,800 square miles; of which, approximately, 128,000 acres are available and easily accessible for agricutural purposes. In the years 1893-1900 the district was systematically and solely exploited for gold which was found principally on the upper reaches of the Barima, Kaituma and Barama Rivers. Closely following on the vicissitudes of the gold industry, the balata industry sprung into being. During the period that the gold industry flourished, and up to within recent years, no farming, or perhaps a little haphazard planting was done in this part of the colony.

The progress of agriculture in the North Western District dates back from the year 1907, when an experimental farm was started at Issororo on the left bank of the Aruka River. This farm, which is one of the district stations of the Department of Science and Agriculture, was opened principally for the experimental growing of rubber. Besides conducting extensive cultivations of the following varieties of rubber ; viz., Para Rubber—*Hevea brasilensis*, the indigenous rubber tree—*Sapium Jenmani*, Central American Rubber—(*Castilloa elastica*,) the West African rubber—(*Funtumia elastica*,) the station also took within its scope the experimental cultivation of local foodstuffs, such as Tannias, (*Colocasia Xanthosoma*) Eddoes (*Colocasia esculentum*) Yams *Dioscoiea sativa*) Cassava (*Manihot utilissima*) Corn (*Zea Mays*), etc. also permanent economic products such as Coffee, Cacao and Limes. Poultry farming was also carried on to a small extent.

The Issororo Experiment Station has been in existence for eleven years. During that period a complete record of valuable statistics have been obtained relating to the cultivation of rubber and the various crops which were under trial. These have been published from time to time in the Journal of the Local Board of

Agriculture. In the years 1911-13, attendant on the successful progress of the rubber experiments both as regards the growth of *Hevea brasilensis* and the yield of rubber obtained, the cultivation of rubber in the district was taken up both by large and small cultivators. During the years 1914-15 the progress of such cultivation received an unfortunate set-back owing to an outbreak of the leaf fungus *Melanopsammopsis Ulei*, which caused a great deal of damage.

The few original provision growers in the North Western District who ventured on the cultivation of the soil were naturally ignorant, or unaware of, correct and practical scientific methods of preparing land for the cultivation of crops. Drainage, which is of the greatest importance on such low-lying lands was a problem, the solution of which was found to be wholly beyond their ability. This lack of knowledge of the principles of agriculture which underlie the successful growing of crops was also a serious barrier to their progress.

The starting of an experimental station was also the commencement of placing agricultural instruction on a sound practical basis. A scheme for instructional work was drawn up which embraced the following heads : (a) Laying out land. (b) Drainage and Empoldering. (c) Preparation of seed beds. (d) Preparation of holes. (e) Correct distances for spacing plants. (f) Selection of seeds and planting material. (g) The principal details appertaining to the subsequent care of economic plants. (h) The establishment of permanent economic crops, such as Coffee, Rubber, Cacao and Coconuts. Instruction in the cultivation of rice was given during later years.

Whilst introducing this plan of improvement, the conservatism of the small number of people who then occupied small plots of lands in the district, was largely overcome by the exercise of tact and patient demonstration. The small measure of progress which was made with these occupiers of land marked the initial advancement of the agricultural welfare of the North Western Distrct. A number of young men were attracted by the satisfactory results of the Department of Science and Agriculture both in the progress of the experiment station and agricultural instruction.

The co-operation of this group of young men was secured and the reformation of the old agricultural policy commenced.

Coffee cultivation in 1910 was comparatively nil. The acreage returns for that year showed an area of 73 acres under cultivation. This figure was only arrived at by summing up isolated, practically abandoned, and irregularly planted plots. In 1913 there was an increase of 250 acres under coffee ; at the close of 1917 the census returns showed the area under cultivation to be 800 acres. This cultivation continues to be an industry of increasing importance in the North Western District. The coffee farms are well laid out into rectangular fields and are maintained under a proper system of drainage. The coffee, which is of the Liberian variety, grows luxuriantly and bears prolificly. The soil of the district is so well suited to the cultivation of this crop that even in their early years of growth the young trees are capable of yielding 8 cwts. of coffee per acre with trees planted at 300 to the acre.

With a view to taking up the question of the cultivation of vegetable products on commercial lines experiments were undertaken at the Issororo Station on extensive demonstration plots which were carefully carried out through a series of seasons. These experiments were conducted on a plan drawn up by the Resident Agricultural Instructor, and approved by the Director of Science and Agriculture. The results of the trials proved that the yields of local foodstuffs grown upon organized plantation lines are highly remunerative. These results gave an impetus to the progress of provision farming in the district. In 1910 the acreage under cultivation of root crops, corn, plantains and other minor articles of food was 825 acres ; at the close of the year 1917 the area under cultivation of these crops had reached 3,000 acres. A census, taken in August 1914 at the outbreak of the European War, showed that the estimated yields of food products within the area under cultivation would supply the local markets for a period extending over two years.

During the year 1917 the cultivation of limes began to receive attention. At the close of the year 26 acres on the lateritic soil of Mabaruma Hill were put under limes.

Activity and continuity in agricultural matters in the North Western District progress. The small body of young and energetic men, by whose activity the old agricultural conditions of this district were so successfully reformed, has been gradually augmented.

With the advent of young men, drawn from a more intelligent class and who intend to obtain a livelihood by agriculture, the time is not far distant when there will be stretched along the banks of the rivers of the North Western District a vastly increased number of flourishing agricultural settlements.

THE MAKING OF A GOOD LAWN.

By John Waby, F.R.H.S.

Perhaps it will be as well to begin with " how not to make it." In our time we have seen many attempts and many failures. Everyone has his own ideas on the matter, and generally it has been the question of expense which has decided how much shall be done : it looks simple enough and there does not seem to be the least reason for obtaining expert advice. Anyone who has a fairly good eye can see when a piece of ground is level and it is expected that nothing more than levelling is needed beyond taking out coarse grasses and weeds ; grass grows freely enough here and so long as the place is well covered that will do. Yes, that is the common idea and it saves expense, but does it pay or give satisfaction ? it decidedly does not, and those who have tried to make a lawn in this way have been very sorry for themselves. Plants are like human beings and require something more than plain existence ; they will live for a time but will not flourish ; the grass on lawns is similar, it needs something more than the plain ground if satisfaction is to be obtained. A lawn, made without any more preparation that simple levelling lacks sustenance, for it cannot obtain such without tillage and drainage. It may be that because it is made on a house plot drainage is taken for granted, though there be no sign of it beyond the fact that water does not lodge on it to any great extent. As a matter of fact very few

house lots have been drained except those drains to be seen on the edges of the lot, and these only deal with the surface drainage or flood water and cannot possibly influence the subsoil.

Many of the open spaces in the house lots are due to the removal of out-buildings, unsightly shanties or tenements being cleared away to enlarge the space about the main house ; and in the country land is taken for building purposes which has previously been used for cultivation of sorts ; or plots are enlarged by taking in a piece of land contiguous ; and we know very well that in such places all drains are open like those of a canefield. So here again there is no subsoil drainage. Open drains, except on the outside edges, on lawns are impossible. So to make a lawn after clearing the space of everything that may be growing on it, a system of subsoil drains must be the first thing to attend to. Of course this means expense, for no new place can be satisfactorily laid out without it ; drainage there must be or all the labour and trouble is more or less thrown away.

Now, we have in a manner shown " how not to do it," and it will be expected that we shall show how it should be done. We must allow that there will be expense, for work is not done for nothing, materials are needed and they cost money too, even the most ordinary levelling costs something, and the final precise levelling more. If you wish for a good satisfactory lawn you must pay the cost, and it is always cheapest in the end to have it done thoroughly even at an expense. Well now, we need not be particular where the ground is, we shall naturally choose a piece most convenient, neither need we be particular as to the soil it is composed of, for that can always be improved if necessary, and the size of the ground, in town at any rate, cannot be very large ; in the country grounds may sometimes be larger providing the owner can pay for it.

The ground must first be cleared of all bush, weeds and stones ; then the drainage must be taken in hand. House lots in town generally have the concrete drains of the streets near which they are situated to give a good idea of the depth to which the drains of the lawn may be laid ; they are not likely to be too deep, still one is not bound to make the drainage as deep as the

drains outside if a lesser depth will serve. What one must see to is that whatever depth is allowable, there is a slight fall to the outside in the drains laid ; you may drain direct out to the street drain, or to the side of your plot which connects with the street drain. Calculate the depth allowable and mark off your drains; they should be from 12 to 15 feet apart,—wider apart than this will not ensure perfect drainage; quite straight, and in digging give a clean bottom ; whether the sides be straight or sloping matters not, as the drains will eventually be filled up, make the drains sufficiently wide to enable the material to be laid without breaking the sides.

Next comes the question, what are going to drain with ? there is not much choice. Undoubtedly the best are drain-tiles, 3 inch generally speaking, if they can be procured; place these end for end along the clean bottom of the dug drain. Your drain will be made a little wider than the width of your tiles, fill this space and for a few inches above the tiles with small stones, small broken granite, or coarse cinders, which will prevent the soil dribbling into the tile drains, then fill in the open drain to the top.

If you cannot afford or obtain this, bottles are the next best things, either stone or glass ; use them whole, laid end for end like the tiles, and fill in the spaces around and above for a few inches with filtering material, such as broken bottles, stones, or cinders. Lacking tiles or bottles, any old material may be used, such as old tins, scrap iron, broken crockery ware, or anything else available that will keep the drainage space below open for the passage of the water, though these are much more likely to choke as there will not be a continuous layer at the bottom.

In a large plot of ground, i.e. more than is needed for an ordinary tennis lawn, it may be advisable to drain from the centre to both sides, so arrangement must then be made for two main drains to connect with the outside street drain ; if not considered too unsightly these could be open drains, but they must be kept clear of weeds and obstructions so as to be sure the drainage water does not lie in the tile-drains. In the country all drains outside the lawn could well be left open, for open drains these are usual and are not considered disfiguring. Having completed the

drainage by filling in the soil taken out, the whole plot of ground should be dug to a fork's depth, or sufficiently deep as not to touch the drainage below ; this will loosen and mix the soil to the depth dug, roughly levelling as the forking proceeds. Small stones, if any, need not be taken out, but must be kept below the surface, as they will assist the percolation of water. If it be possible, a thin layer of decayed manure, well pulverised, should be spread all over the ground and lightly forked in, more especially if the soil be poor. Now comes the turfing. The ground must be thoroughly levelled, filling in any depressions there may be, so that there will be an even surface all over. In temperate climates the turfing is generally done by obtaining from a chosen surface elsewhere, short-grassed clean turf, which is cut in long strips about 12 inches wide and rolled in long lengths, the turf cut about 1½ to 2 inches thick by means of turfing irons ; this is then conveyed to the newly levelled space and unrolled, each length laid closely side by side till the whole ground is covered. This is an expensive operation, but is the usual performance. Here we cannot attempt this because our grass will not roll satisfactory. Instead we have to adopt a simpler method, but it takes longer to get the surface well covered. Bahama grass, which is the best we have and well suited for the purpose, is obtained in small pieces, from the roadsides, where there is generally a good quantity of short growth coming up where the sand and fine burnt-earth has washed up ; and this is taken to the new ground, planted a few inches apart all over and rolled in. Should the weather be damp this will soon commence to grow and cover the space. Should the weather be dry watering must be resorted to. In these operations there is sure to be slight depressions formed and these must be at once filled up with finely prepared soil and the whole ground frequently rolled.

Mole Crickets now and then make their appearance on lawns and cause bare patches by eating away the roots of the grass. They can be easily traced by the holes and shallow burrows they make on the surface ; they can be brought out of their burrows by pouring lime-water or soap-water into the holes, when they can be easily caught.

Wire-worm cause a deal of damage on lawns in temperate climates, and are occasionally found here, not so much in town as in the country where they attack the lawns from the surrounding bush. These are less easy to deal with than Mole Crickets as they are grubs which last in that stages for several years and feed on the grass roots all that time. Very little is known as to means of dealing with them beyond the old-fashioned way of cutting potatoes and such tubers into slices and burying them in the soil, the grubs burrow into these slices and so are caught. Should they appear, the lime or soap water could be tried as well as potato slices.

Occasionally we get a visitation of the looper caterpillar which will strip the lawn of every green leaf. An application of arsenate of lead will soon dispose of them.

HINTS ON BOUQUET AND WREATH MAKING.

By Eleanor S. Waby.

The custom of sending Wreaths, Crosses, Anchors, etc., as tokens of sympathy, respect, and loving regret, to be placed on the graves of relatives and friends has become so general that it scarcely seems necessary to give hints or ideas as to their making. But in this art as in every other, fashions and styles change with the times. In almost every town or city overseas there are regular classes of instruction in the dainty and fascinating art of Bouquet and Wreath making.

Unfortunately in the Tropics where flowers fade almost as soon as cut very few of the directions given in Schools or books can be applied. I have given many, very many, practical lessons in Bouquet and Wreath making, both in the old way of stiffly wired bunches and in the present natural way, i.e. showing the beauty of each flower and have found invariably that true lovers of flowers and gardens require very little teaching.

Long ago the only memorial tokens seen in Florist's shops were made of Immortelles or Everlastings dyed in various colours, the ground work was of small flowers tightly packed on the selected frame-work. A suitable motto or inscription being picked out in a contrasting colour.

Now, Wreaths, Crosses, Harps, etc, made of the most exquisite freshly cut flowers according to the season are displayed, and those made of simple wild flowers are as beautiful and as well arranged as those of costly orchids or other hot-house blossoms.

In bouquets, instead of a tightly packed and stiffly wired circular bouquet each flower placed with almost mathematical precision, enclosed in a glazed lace paper holder, or three cornered wrapper, the Bouquets now shown are things of grace and beauty. Showers, sprays, posies and many other forms according to individual fancy, but one and all leaving the flowers in their natural loveliness.

The great difficulty in making Wreaths etc in the Tropics is that they are wanted generally at a very few hours notice, and must be made hurriedly, and although flowers bloom in great luxuriance all the year round it is not always easy to get just what we want, but we can always get something and it is as well to know how to use what we can get to the best advantage. The lovely Eucharis lilies, the waxen like Stephanotis, the purely white Cape Jasmine with its cammelia like blossoms are of course the choicest and best, but there are many others.

The best foundation for a wreath is a hoop or ring of small twisted wire ; for a small wreath this should be made 7 inches in diameter, medium 8 inches, 9 for a large one ; if wire is not available a good substitute may be made of long thin branches of limonia, tamarisk, hibiscus, and other bushes, stripped of foliage and bent to shape; card-board frames should never be used as the moisture of the flowers destroys them sometimes even in the making.

I have tried in vain to get any really good substitutes for the moss-covered frames sold in florists shops abroad. Materials cannot be procured in a hurry and if made in advance they mildew or dry up.

If it be possible, flowers for any purpose whatever should be cut in the early morning, the stalks only put in water ; and if they are not to be used at once a bit of netting or muslin wrung out of water laid lightly over the blossoms ; single lilies, or pieces of Stephanotis put in a shallow dish or soup plate and covered; maidenhair and other ferns carefully shielded from wind and dust. Almost any kind of fine green foliage may be used for covering the frame. A generous covering holds moisture and helps to keep the blossoms fresh. Pilea, (lace fern) Panax, (Angelica) Asparagus, and various grasses may be used for any memorial wreath to edge and make up with flowers. The flowers should be prepared by picking off all superfluous leaves, sorting ready to hand, the stalks should not be cut too short or the flowers will not show their beauty but lay in a packed mass ; in using the smaller kinds of jasmine it is necessary to bunch them but it should be done lightly ; personally I never wire flowers if I can help it ; single lilies and anything with little or no stalk may be tied on a fern frond or a strong stalk with a piece of soft knitting cotton or fine string ; wire often cuts quite through delicate stems.

When choice flowers are scarce they should be counted and used judiciously, that the Wreath may be uniform, or if there are only one or two they should be reserved and tied in a tasteful group, when the wreath is finished, with or without a ribbon bow. White Ixora, Coralita, Vincas, King of flowers, make a good foundation for delicate blossoms.

It is a good plan to make half the wreath and start round again from the beginning as the first flowers often lie flat and spoil, the shape.

A wooden frame is necessary for a Cross ; it should be about an inch wide, 18 inches long, transverse 12 inches ; the same rules apply as for wreaths, except that the flowers should be well raised at the cross-way centre and all the best flowers arranged there ; ribbon if any, tied at the base.

Anchors should never be tied with ribbon ; white cotton or silk cord should be knotted at the top carried down to the bottom and tied in a loose knot. The strings for a harp should be of silver wire, one or two of them must be cut at the last and slightly frayed. Sprays lightly tied together according to taste.

If it be necessary to keep made-up designs over-night they should be laid on a table covered with a thick wet cloth and lightly covered ; spray with a fine-rosed water pot or gently sprinkled with rain water if the weather is hot and dry.

BOUQUETS.

The more simple a bouquet is the prettier and more fashionable it is in these days. Flowers for bouquets should always be cut with long stalks. Posies are the simplest but require art in arranging, each flower should show its individual beauty and the beauty of its natural foliage, the tying must be done as near the bottom of the stalks as possible. Roses are of course the best but all flowers and ferns adapt themselves to posies. Shower bouquets are more elaborate ; we have not here the many pretty trailing blossoms that arrange themselves in a shower as the " trails " have to be made.

A strong hook of three loops should be used, one large enough for the thumb of the person carrying it to go through, the other two for tying flowers to which are heavy if the bouquet is a large one ; this must be coverd with white cotton or silk to avoid rust. In making the " trails " be they many or few, no wire should be used ; any tying done with narrow tape or soft string and the be used ; any tying done, with narrow tape or soft string and the tying hidden by bows of narrow satin ribbon ; a long stalked-frond of fern is a good foundation for trails ; the other flowers should be arranged to look as if they had been carefully gathered and just tied together before attempting a choice bouquet ; it is a good plan to practice a few times with ordinary flowers as it takes a good deal of practice to get perfect ; the great thing is to have it as light as possible both in weight and appearance. When finished, before putting on the ribbon, it should be hung on the back of a chair and sprayed or sprinkled, taking care that it is out of the wind.

There is one thing that must be said and that is some of the most beautiful and careful work in Bouquet and Wreath making is

spoilt by the careless way they are carried to their destination ; few people think it necessary to send anything to put them in and they are exposed to scorching sun, hot winds, or pouring rain, to say nothing of careless travelling.

BOTANICAL NOTES.

SOME INTERESTING SPECIES OF PALMS.

The Caryota's. There are some 13 species, all belonging to the Eastern World. They form a special feature in the foliage and are of a different type to most palms, combining the feather-leaved with the fan-leaved forms, inasmuch as the general plan of the leaf is feather planned with large branches inert and the leaflets or pinnae fan-planned i.e., all cuneate, triangular, or fish-tail form, the broad ends notched or toothed. Locally they are known as " Wine " or " Toddy," or " Fish-tail " palms. They are all very handsome palms; two of them, *Caryota urens*, and *C. Rumphiana*, large growing with single stems, 40-60 ft. in height, with the base of the stem a foot or more in diameter, with very decided rings where the leaves have fallen off. The other species grow with a large number of stems, some of them measuring 12 feet or more through the cluster.

All Caryota's, whether single or many-stemmed, grow to their full height and then produce the first spadix at the summit, the subsequent spadices lower down successively towards the base. The life of the single stemmed kinds is completed after the basal spadix has flowered or fruited, and as the separate stems of the many-stemmed forms complete their flowering they die. The flowers are monoecious on separate spadices, i.e. each spadix contains the flowers of one sex only. The leaves of the single-stemmed species are very large and heavy, from 12-15 feet or

more long ; with a similar spread of branches ; stiff in their strength yet gracefully arching. Their spadices are also very large, pendant, with thick cord-like branches ; some 6-9 to 12 feet long. *C. Rumphiana* is the largest in every way.

C. urens is the species best known and is said to be a most useful plant where it grows abundantly. The unopened spadices yield in the hot season a sugary liquid, which on being fermented makes Toddy or palm wine. The best trees yield at the rate of 100 pints in 24 hours. This is obtained by tightly bandaging the spadices and cutting a piece off the end, a receptacle being placed beneath the cut to catch the liquid. The pith of the old trees is said to be equal to the best sago ; the natives make it into bread, and boil it into a thick gruel; these form a great part of the diet of the people whose country it inhabits, especially in times of famine. The name *urens* is given to it on account of its stinging fruit. I knew well enough there was something stinging about the plant somewhere, and found it to my discomfort on tasting the fruit, when I found a sensation on my tongue equal to the biting of a dozen ants.

The species known as *C. mitis*, (*sobolifera*) is an exceedingly handsome plant, growing to a height of 15-20 feet, with a mass of stems all round measuring quite 12 feet through the mass.

In the collection of palms of the Botanic Gardens there were but two (2) species in 1884, *C. urens* and *C. mitis*, formerly known as *C. sobolifera*. In 1885 four (4) more species were added. The first *urens* flowered in 1887, 7 years after being planted. Plants of this species commenced to flower at the Public Buildings in 1888, eight years after planting. These were much larger plants than those of the Botanic Gardens, probably owing to the much drier nature of the soil. The large plants in the Avenue of the Botanic Gardens began to flower in 1898.

J.F.W.

The Arenga's. There are but 4 species of the genus *Arenga* known ; all eastern products. Only two of these have been imported here, *A saccharifera*, the " Gomuti palm " of Malaya and Burma, and *A. Wightii*. The habit of these two species is dif-

ferent ; the first is singled stemmed and the latter of many stems, i.e., it has a strong central stem with several suckers around it. The stem of *A. saccharifera* reaches a height of 20-25 feet or more and is covered from base to summit with "coir," the bare stem at the base being about one foot in diameter. The leaves are large and heavy, on the feather plan, 18 to 20 feet or more long ; leaflets 3 feet long fairly broad, wide apart, set at different angles, often in groups ; flexible, dark green above, silvery beneath ; the base of the leaflets eared on one side with 2 or 3 notches, the points also notched.

The genus has the same peculiarity in its flowering as the Caryotas ; i.e. growing to its full height and producing its first spadix at the the top, subsequent ones below. *A. saccharifera* bears spadices 4-5 feet long, branches thick, simple, pendant ; spathes persistent. The flowers are monœcious on separate spadices, the males emitting a strong perfume like sandal-wood. The fruit is about an inch in diameter and length, end flat, triangular.

This palm is said to be a most useful plant in its native habitat. Like *Caryota urens* it yields a large quantity of sugary liquid from its spadices, which is made into sugar and wine. Sago of a good quality is obtained from the trunk,—as much as 150-200 lbs. weight from a single tree. The timber is exceedingly hard and used for building purposes, and the strong black fibres called " gomutie " are extensively used for making cables and ropes.

A. Wightii, as before mentioned, has several stems and makes a much more imposing looking plant ; the leaves of the central stem being similar to those of its congener, whilst those of the subsequent stems or suckers are much smaller. The spadices and fruit are also similar. In watching the growth of a plant of this species in the Avenue of the Botanic Gardens, I found that it takes 3 years from the time of flowering for the fruit to ripen. Naturally the life of this species is longer than that of its congner, because after the central stem has finished its course there are side stems to continue flowering and fruiting.

J.F.W.

GARDEN, FIELD AND FOREST.

[Some thirty years ago there appeared in the Demerara 'Argosy' a series of weekly articles dealing with the above subject from the facile pen of that well known naturalist and botanist the late G. S. Jenman * A few reprints, in book form, were published at that time nearly all of which have since disappeared. We were fortunate enough, a few days ago, to procure a copy of this rare edition and, on account of their inaccesibility to the general public and the extreme value of some of their contents, we propose to publish extracts in this and following numbers of the Journal. Editor.]

" *Tropical Growth.*—In squalls or a strong breeze of wind in this country, when the land is flooded or heavily saturated with water, trees are very liable to be thrown down, and palms, which have a greater root-hold, than other trees, to be tilted out of the perpendicular. During a heavy fall of rain lately, a large Eucalyptus (E. microcorys, F. U. Muller) was lost in the Botanic Gardens in this way. It was planted on the 30th July, 1880, hence less than eight years ago, among the first batch of plants put in the gardens. At that time it was about 18 inches high. From end to end as it lay, after being severed from the stump, it measured 68 feet, and allowing for the stump and curves in the stem the length was over 70 feet, which, again allowing for its height when planted, averaged over 8½ feet vertical growth each year of its age. The circumference at ? feet from the ground was 3½ feet. The vertical growth was greatest in the earlier years. The first year it grew at the rate of 2 feet per month; the second at 1¾ feet per month; the average of the third year fell to barely 1 foot per month; this rate gradually, but very slowly decreasing to the end of its life. The average for the first six years was ten feet a year at the end of which time the girth at the ground was 39 inches, and at 6 feet up the stem 29 inches. The vertical growth of this tree was the most rapid of any in the gardens, but that of several other Eucalypti and Casuarinas has been not much behind it."

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The Manufacture of Crab Oil.—Take the nuts and boil them until the kernels are soft ; then sweat them by putting them into heaps or baskets (under cover) covered over with plantain leaves for not less than two weeks, after which spread them out to dry or become oily. This will happen in about a week after they have been spread out. During this past week, the nuts must be turned over at least once per day ; at this period, after expiration of the week. the inside of the nuts will show oil on being pressed by the fingers. They are then fit to dig, that is, split open the nuts and take out the kernels. If you do not, the shells of the nut will absorb a good percentage of the oil you should get. The kernels of the nuts being put together you have the mass put up as before for sweating again in the baskets or heaps for a day or two. It is now that oil making begins. Place the mass into tubs or troughs ; then mash or thoroughly knead it into a sort of dough or paste. This paste is now capable of turning you out three distinct qualities of oil. Being placed in shoot-like receivers, and in doors, you obtain a first quality oil, thin, transparent, and excellent, with very little smell. The paste must be kneaded every day and set out. The run will cease in about 4 to 6 days. After that, you start making a second quality oil, by now resorting to the out-door heat of the sun. This gives a clear oil too, but its colour changes, becomes cloudy or whitish and it smells stronger than the first quality. After the mass stops running oil, you now make a third quality oil. This is done by heating or roasting the mass in open pots or pans over the fire, then pressing through a matapee, in the same way as cassava is squeezed. Thus you get every particle of oil that is to be got. This third quality oil is of a high dark colour, has a strong smell, and becomes almost the consistency of tallow. This last quality oil I consider the best for use in stables or in gardens, to keep insects off horses, cattle, etc., and on harness. There is no doubt of it, crab oil is a most valuable oil and as to crab wood for furniture it is the mahogany of the colony.

It is most effectual in allaying any kind of irritation of the skin, from whatever cause it may arise, and soothes and relieves the prickling which accompanies the rash of that very common disease, prickly heat. Where the skin rubs, in the case of persons

over fat, on the inner side of the limbs, it prevents chafing and rawness, and when the latter has occurred its applicaton affords instant relief. Bruises or abrasions of the skin, such as one often get in bush travelling, heal much faster under its application ; and in deeper wounds it is very serviceable applied alone or in poultice. Its great use however is to the traveller, for which it is almost in daily requisition, as a prevention against the attack of bush parasitcial vermin, called ticks, or as a relief from them when the body or other part has become infested. Everyone living in the Western tropics knows how troublesome certan kinds of ticks are, how irritating to the skin, and how disturbing to sleep at night. In the interior one, who travels through the forest or bush much, is hardly ever free from them. The application of crab oil on going to bed will secure a night of perfect rest and tranquility instead of irritaton and unrest. In travellng in the interior, too, some of the wayside temporary sleeping places of the Indians are found by the traveller, who seeks for the night the accommodation they afford, infested with dog fleas, with which most Indian dogs swarm. Nothing will so effectually prevent sleep as these troublesome little creatures, but if a little crab oil be rubbed on the skin before retiring, however badly the place may be infested. not a flea will be felt for the night. Crab oil is also reputed to be a good relief for asthma. It is most certainly a very useful oil, and its properties deserve to be made widely known.

" *The Locust plague in Venezuela.*—From the correspondence published when the visitation of locusts appeared here two years ago, we are well aware that for several years past the neighbouring country of Venezuela has been an almost constant home for these pests, and that they have inflicted enormous damage and loss on the vegetation of the country. Mr. Bungeroth, a gentleman who has resided in the interior of the country for the past three years uninterruptedly, collecting orchids for a large European company, came here two or three weeks ago, to get a passage to England, and called upon me. giving me much interesting information about the far interior of the country, its vegetation, pepole, conditions of travel, and much else. I was anxious to know from an eye witness what might be said of the locust plague, and the kinds of vegetation that disappeared under its

ravages. It was reported here two years ago, when we were concerned with the locusts, that they would not eat sugar canes or sugar cane leaves, and in places this seemed to be confirmed by large numbers being found in canefields from which no damage was suffered. Mr. Bungeroth had been in districts swept bare, almost, by inconceivable numbers of the pests, and I was therefore anxious to hear what was his experience on this point. His answer was that while softer vegetation is obtainable they will not eat canes, but when such is no longer to be had, they eat canes readily and destroy them wholesale, and that the protection of canes in a district he had known only lay in the abundance it afforded of softer and more succulent food. Their paradise is a provision field : cassava, sweet potatoes, bananas, plantains, peas and beans, the various calalues and all herbs disappearing under their presence as if by the hand of a magician. The ruin thus perpetrated among a people who had little else but these plots of provisions to depend upon for the sustenance of life was in many districts complete, and caused much sad distress. The myriads of locusts were so great that it was quite impossible to cope appreciably with them. They were not merely in swarms, or in sheets that covered the vegetation or ground, but in heaps and piles, layer over layer. Great damage was inflicted by them upon cocoa and coffee plantations as well as elsewhere. Not that they ate the leaves of these trees, for they did not touch them, there being some flavour in the leaves of both cocoa and coffee—a bitter taste Mr. Bungeroth said—which protected them. The damage was done by the myriads of locusts which lodged on and covered in layers and heaps the branches of the shade trees in the plantations, the weight of which was so great that the trees were quite broken down, branches as large as a man's thigh being unable to stand the strain. Such damage was done by the branches falling on, and breaking down, the cocoa and coffee beneath, and more still by the sudden admission of the blazing sun on foliage that had hitherto been thickly screened from its rays, and which scalded and burnt it up, thereby destroying or greatly injuring the trees. Thankful we may be that we have had no experience of the kind in this colony, yet, but it shows to what we are liable under a heavy visitation of the pests."

"*Miscellaneous hints on Gardening.*—Never trust your choice plants to the management of the ordinary workmen. Too much or too little water will greatly damage them ; and only he who has constantly watered them can discriminate and give to each just what it wants.

Never grow a bad variety of anything if you can help it. It takes the same room and attention as a good one.

Never look for cheap seed shops. It is only by getting good prices that a seedman can supply articles to be depended on.

Let the drainage of the soil be the first care. It is impossible to succeed to any extent with plants or seeds where the water is stagnant in the soil.

Gather fruit in dry weather and with the sun shining, and place it as carefully in the basket as if it were glass. The smallest bruise induces decay.

Never subject plants to sudden change. Sudden check and sudden excitement should be equally be avoided.—*R. Ward.*

LOCAL NOTES ON ANTHRAX.

By A. Seton Milne, M.R.C.V.S., F.E.V.M.S.,
Government Veterinary Surgeon.

Anthrax is a specific, infective, bacillary disease caused by the entrance into the body of the Bacillus Anthracis. The most common animals attacked here are mules, horses, cattle and pigs. A common way by which the disease is spread in British Guiana is by dogs and carrion crows. An animal dies suddenly in the pasture and its carcase is allowed to decompose there. In a short space of time dogs and carrion crows have torn the carcase to pieces and eventually move off to another pasture perhaps a mile away which of course becomes thus infected.

DIAGNOSIS.

There are very few external symptoms. In a few cases a swelling forms reaching from the jaw down to the dewlap ; temperature up to 107 degrees F; the animal turns round and

round a few times and then drops dead. This death of the animal is accounted for by the fact that the bacillus multiplies with extraordinary rapidity in the blood. I will not give the post mortem symptoms here as if a post mortem has to be made it should be performed only by a fully qualified Veterinary Suregon.

PRECAUTIONS TO BE TAKEN.

If an animal dies suddenly a post mortem should not be made but the Government Veterinary Surgeon should be notified at the earliest opportunity or, if anyone is at hand who is capable of making blood smears on glass slides for microscopical purposes this should be done and the preparations sent to the Government Veterinary Surgeon who will examine them and give information at once as to whether it is anthrax.

TREATMENT OF CARCASE.

The carcase should be at once burnt. Some people seem to require the hides on these occasions. This should never be allowed on any pretext whatsoever as besides being a positive danger to the individual it is also a sure method of spreading the disease by infecting the ground with the blood of the carcase whilst skinning. *Burn the carcase whole.*

PROTECTIVE INOCULATION.

As there is no known cure for anthrax the measures to be adopted should be preventive i.e. inoculation. This is not a safe procedure in any laymans hands. The Government Veterinary Surgeon is quite willing to instruct anyone how to correctly and efficiently perform the operation. The Department of Science and Agriculture has always a stock of the necessary vaccine, needles and syringes on hand at the Government Laboratory, Broad Street; consequently there is no excuse for anyone not having their animals inoculated. It is only by extensive inoculation that anthrax will be eliminated from the colony. The death rate within the last few years has gone down to a great extent and that is due to the fact that a large number of cattle have been inoculated yearly. As a last word of advice *Burn the carcase whole.*

REPORTS OF THE MONTHLY MEETINGS OF THE DISTRICT FARMERS ASSOCIATIONS.

ABARY FARMING ASSOCIATION.

Regular monthly meeting held in the Catherineville Wesleyan School on 23rd June last. Present J. H. S. Pollydore, Vice-President, Charles Crawford, Honorary Secretary and 20 other Members. The Minutes of the last meeting were read and confirmed. Delegates to the Congress gave accounts of the business done. The Meeting expressed the hope that the Congress was bound to further the cause of Agriculture in the Colony. Several members reported that good crops had been reaped from the supply of seed peas distributed by the Director of Science and Agriculture. Resolved that the thanks of the meeting to the Director be recorded on the Minutes. It was reported that a member who had had several bunches of plantains stolen from his farm on informing several well-known thieves that the matter had been put in the hands of *an obeah* man (this was only a ruse) discovered next day that the plantains had been returned. Meeting agreed that praedial larceny was increasing. Several other important matters were considered and the meeting adjourned.

MAHAICA, SUPPLY FARMING ASSOCIATION.

Regular monthly meeting held on the 30th June at Supply Wesleyan Church. Rev. E. R. O. Robertson, President, in the Chair. Owing to the inclemency of the weather and the sparse attendance, the meeting was postponed.

MEETING OF THE PORT MOURANT ROSE HALL FARMING ASSOCIATION.

A Committee Meeting of the Port Mourant-Rose Hall Association was held in St. Joseph's Schoolroom, Port Mourant on Wednesday night 5th June 1918, Mr. C. A. Birtles, Vice-President presiding, with the Rev. T. Wilkes, Messrs. W.

McGee, E. J. F. Read, J. Kattick, D. W. Fingal, Ramesur and W. W. T. Sullivan (Secretary) in attendance. After the adoption of the minutes, the financial statement was laid on the table.

Thirty-nine members paid the Annual Subscription and seven members paid the Quarterly Subscription. Correspondence from the Board of Agriculture and the Secretary of the British Guiana Farmers' Conference was considered. The Committee decided to make an application for affiliation and a grant-in-aid to assist the farmers. The invitation to attend the Congress of farmers on the 17th June in the Town Hall, Georgetown, was accepted, but it was found to be very inconvenient to send a delegate.

A discussion arose from a complaint of several farmers in the district of Rose Hall on the failure of the Village Council " to guarantee a proper system of drainage for the cultivation lots," in accordance with an agreement made on 16th March last. The Secretary was authorised to write again and urge the Councillors to pay more attention to the question, so as to safeguard the interests of the farmers to such an extent that the Competition which will take place during the first week in December may be a success. The meeting then adjourned " sine die."

WEST COAST AGRICULTURAL ASSOCIATION.

The " West Coast Agricultural Association " had its birth in 1908 at Anna Catharina West Coast Demerara, the chief founder being the Rev. W. A. Deane who was then a schoolmaster and its Honorary Secretary. It died out owing to the removal of the Honorary Secretary to Bagotville in 1909. Upon the request of Messrs. Boodhoo and H. D. Hack, Rice Factory owners of Windsor Forest and Hague, West Coast, the Rev. W. A. Deane resuscitated the defunct Association in April 1918 at Hague ; its meetings being held monthly since Planters and small farmers were duly circularised as regards the revival of the much needed Association. Messrs. Hack, Boodhoo and A. M. Barcellos are respectively President Vice-President and Treasurer. The Agricultural Board sent a quantity of three varieties of peas for distribution

among *bona fide* farmers who were glad to get and cultivate them. The Rev. E. R. O. Robertson, the energetic Honorary Secretary of the British Guiana Farmers' Conference, as directed by the Agricultural Board, was communicated with and be fully instructed our Honorary Secretary, the Rev. W. A. Deane as to the course of action for the affiliation of the Association with the Agricultural Board. The President, Vice-President and Honorary Secretary and the Assistant Secretary Mr. Thomas Wharton attended the recently held Agricultural Congress. Mr. James Low of Anna Cathrina who was the late Treasurer handed over $8.32 to our Honorary Secretary, an amount which he banked in 1908 for the defunct Association now revived. Our membership is 30—We hope to do our best to develop the agricultural potentialities of our Colony.

WEST BANK FARMERS' ASSOCIATION.

A meeting of the above named Association held under the Presidency of Mr. T. Earle on Monday June 3rd 1918. Members present were Messrs. T. Earle, President, J. Craig Vice-President, T. W. Layne, Secretary, Samuel Eastman, William Forde, James Cole, James Hescott, Josiah Forde, James Allen and Nathaniel Haynes. Letters from the Board of Agriculture were read by the Secretary stating that no grants-in-aid would be given this year to Local Agricultural Shows, but that money at the disposal of the Board should be devoted to Farmers' Competitios principally in connection with the raising of foodstuffs. Also a letter from Rev. Eric. R. O. Robertson acknowledging the sum of $5 sent as Annual Subscription from the West Bank Farmers' Association to the British Guiana Farmers' Conference. A letter inviting two delegates to represent the Association at the Congress to be held in the Town Hall on the 17th June 1918 was read. T. W. Layne and S. Eastman were proposed and agreed as delegates. In connection with the Farmers' Competition the Secretary urged and encouraged members to try their best to prepare not less than one acre of land. There were other minor matters discussed and the Meeting closed at 6.15 p.m.

WAKENAAM FARMERS ASSOCIATION.

At a meeting of the Committee of Management of the Wakenaam Farmers' Association held on the 14th June the advisability of offering Prizes, three each, for the best cultivated and kept half acre of canes, ground provisions and rice, also the formation of a bank, under the Control of the Association was after a full discussion, agreed to. The matter was placed before the members for adoption at a Genenral Meeting held on the 21st June 1918, the Committees recommendations were wholly adopted, and an extra prize was agreed to, to be offered for the best cultivated plot, of half an acre, of ground provision, not over four months old. This was to cover the age that was not admitted for any prize in the first instance. Fifty-three members cut canes in April and received payment from the estate for 320 punts, 2½ tons to the punt at $8.25 per punt, less 53 cents for weight of chains and loading of punts, $2470.40 was realized. The area cut was about 41 acres.

Farmers, through the high cost of labour, find that cane farming at the price paid for the canes by the estate is not paying, and unless something is done it is likely that a decrease in the cultivation will take place after the October grinding ; the Committee of Management is seriously considering the matter.

There is a revival of ground provision planting, and the Association is doing all it can to encourage farmers, not only to cultivate, but to get the best results possible for their labour. With the offering of prizes and formation of the bank, the Committee of Management hope to see a live interest taken in Agricultural matters by farmers and so make their lot a happier one.

EXPORTS OF AGRICULTURAL AND FOREST PRODUCTS.

Below will be found a list of the Agricultural and Forest Products of the Colony exported during the first six months of the year 1918. The corresponding figures for the two previous, and the average for the four years previous to that, are added for convenience and comparison.

Product.	*Average 1912-15.*	*1916.*	*1917.*	*1918.*
Sugar, tons ...	29,704	37,494	52,696	34,867
Rum, gallons ...	1,573,840	2,496,763	1,718,069	1,547,526
Molasses, gallons ...	53,530	...	863	7,886
Cattle-food, tons ...	2,281	522	1,023	1,126
Cacao, cwts.	174	29	...	50
Citrate of Lime, cwts.	23	304	84	8
Lime Juice, gals. ...	*	*	5,249	4,099
Essential Oil of Limes, gals.	*	*	166	102
Coconuts, thousands	872	893	1,150	596
Coconut Oil, gals. ...	*	14,156	11,913	20,344
Copra, cwts. ..	799	1,206	451	1,452
Coffee, cwts.	1,033	2,342	1,863	1,432
Kola-nuts, cwts. ...	...	...	...	8
Rice, tons	3,756	8,590	9,602	6,643
Ricemeal, tons ...	650	85	49	5
Cattle, head ...	395	341	487	272
Hides, No. ...	1,975	2,551	1,153	1,316
Pigs, No. ...	705	612	455	...
Sheep, head ...	18	22	9	10
Balata, cwts. ...	3,328	4,194	4,378	2,373
Charcoal, bags ...	32,904	27,431	22,394	18,759
Firewood, Wallaba, etc., tons ...	4,924	6,099	5,002	3,790
Gums, lbs. ...	1,164	883	112	...
Lumber, cub. ft. ...	155,386	211,015	55,205	55,658
Railway sleepers, No.	2,134	1,825	16,413	6,000
Rubber, cwts ...	...	55	64	...
Shingles, thousands	1,055	1,011	1,418	1,181
Timber, cub. ft. ...	151,116	71,231	22,489	6,126

* No records available.

Yet again. At this period of the year the sky at night is reddened by conflagrations taking place in the canefields. The cane trash is being burnt off prior to the cutting of the canes. This practice means the destructon of hundreds of tons of valuable material which, instead of being burnt, should be judiciously incorporated with the soil and thus, not only materially increase the vegetable matter therein, but vastly improve the tilth thereof. The improved yields obtained from mulching with rice straw amply demonstrate these points. This insidious, incendiary habit has slowly but surely become a practice on many of our sugar plantations. It has become the custom; let future generations pay for it.

To take a final example and one which is, perhaps, the most vital of all. Health is the first wealth. Why then is disease allowed to exist almost unchallenged among all the various classes of our agricultural communities? The statistics regarding malaria in the country districts make sorry reading. It is a preventible disease, yet it is the custom to disregard it.

The agriculturists of British Guiana, regardless of class, have much of which they are justly proud; there is also, that of which they should be ashamed.

RECOGNITION OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE.

In the "Official Gazette" for September 28th, 1918, the following Government Notice (No. 112) appears:—

GOVERNMENT SECRETARY'S OFFICE,
Georgetown, Demerara,
27th September, 1918.

His Majesty the King has been pleased to appoint the Honourable John Burchmore Harrison, C.M.G., M.A., F.I.C., F.C.S., F.G.S., F.G.S.A., &c., Director of Science and Agriculture, to be a Member of the Executive Council for the period of five years from the 13th July, 1918.

SUGAR CANE MANURIAL EXPERIMENTS IN 1917.

Carried Out on The Board of Agriculture Experimental Fields, Botanic Gardens.

BY PROF. J. B. HARRISON, C.M.G., AND ROBERT WARD.

The rainfall at the Botanic Gardens from January 1st to December 31st was 92.22 inches. In January, June, November and December the total precipitation exceeded 11.5 inches in each month. In February, March, April, September and October the precipitations amounted only to 3.09, 3·82, 1.67, 4.08, and 5.51 inches respectively. In each of the other months it exceeded 6 inches except for an unusual period of partial drought from February to April during which only 8.58 inches of rain fell· The distribution of the rainfall was fairly regular and favourable to the growth of sugar cane.

One-half of the South Field after laying fallow from cane cultivation for two years was placed under cultivation in June 1916. At the commencement of the fallow period Bengal beans, *Stizolobium aterrimum*, were sown throughout the field, the beans, however, did not spring well nor did they produce a satisfactory cover, and the land was purposely allowed to become covered with a spontaneously growing mixed herbage consisting largely of the following leguminous plants: Phaseolus semierectus, Sesbania aegyptica, Crotalaria retusa, Desmodium adscendens, Derris scandens, Desmodium barbatum, Desmanthus depressus, Crotalaria incance, Cassia Tora, Centrosema brasilianum. Other non-leguminous spontaneous herbage consisted mainly of:—*Graminaceae*—Paspalum conjugatum, Cynodon dactylon, Panicum colonum; *Cyperaceae*—Fimbrisaylis miliasea, Fimbristylis spadicea; *Acanthaceae*—Ruellia tuberosa; *Boragineae*—Cordia Aubletii; *Malvacae*—Malachra capitata; *Scitamineae*—Heliconia acuminata; *Solanaceae*—Solanum asperum, with other plants and grasses in very subordinate quantity. This herbage was cut and forked in twice each year during the period the land was in fallow from sugar cane.

The following varieties were planted on the South field:— D 248, D 108, D 493, D 59, D 570, D 181, D 5

D 367, D 239, D 438, D 648, Green Transparent and D 118. The last named variety is grown on the North-East and South-West plots of the field as a standard for comparison with the others.

The following shows the average yields of these varieties in tons of canes and of indicated sugar per acre, the average specific gravity and purity of the expressed juice and its content in lbs. per gallon (hectograms per litre) of saccharose and glucose:—

Variety.	Canes tons per acre	Expressed Juice.				Indicated Sugar Tons per acre.
		Per cent. Canes.	Specific Gravity.	Lbs. per gallon.		
				Saccharose	Glucose.	
D 118	33.1	62.3	1079	1.949	.028	3.78
Green Transparent	28.6	72.2	1076	1.910	.021	3.69
367	30.4	69.7	1074	1.840	.026	3.63
181	30.5	61.3	1075	1.804	.026	3.08
248	31.0	60.2	1071	1.736	.023	3.04
108	26.5	60.8	1080	2.035	.027	3.04
59	26,6	68.2	1075	1.804	.035	3,04
648	24.6	67.2	1075	1.874	.021	2.94
493	25.0	70.4	1069	1.661	.024	2,72
438	23.9	62.4	1076	1.921	.018	2.65
5	25.3	56.2	1074	1.814	.030	2.36
239	26.0	54.4	1085	1.736	.029	2.20
570	27,0	51.1	1068	1.637	.032	2.11

The plots were either unmanured or received 40 lbs. or 60 lbs of nitrogen per acre in the form of sulphate of ammonia. The results of these manurings are shown in the following table:—

Variety.	Tons Canes per acre.			Tons indicated sugar per acre.		
	No Nitrogen	Low Nitrogen.	Medium Nitrogen.	No. Nitrogen	Low Nitrogen.	Medium Nitrogen.
D 118	26.2	35.6	37.4	3.02	4.09	4.27
Green Transparent	22.2	33.6	29.9	2.79	4.38	3.91
D 367	24.5	32.9	33.8	2.96	3,91	4 03
D 181	29.9	29.5	32.2	3.27	2.85	3.12
D 248	24.8	34.3	33.9	2.40	3.39	3,34
D 108	22.7	30.9	25.9	2.59	3.54	2.98
D 59	20.7	28.2	30.8	2.38	3.22	3,51
D 648	22.2	28.2	23.4	2,63	3.38	2.81
D 493	20.0	26.9	28.0	2.22	2.91	3.03
D 438	18.1	27.5	26.0	2.02	3.05	2.88
D 5	20.6	27.5	27.9	2.04	2.51	2,54
D 239	20.5	27.6	29.9	1.98	2.21	2,40
D 570	19.5	30.4	31.0	1.54	2.37	3.42
Mean	22.4	30.2	30.0	2.45	3.22	3.17

As a rule the increased manurings with sulphate of ammonia did not result favourably, although the lower applications resulted in comparatively large increases. This was doubtless due to the prevalent weather conditions, the period of actual growth not being long enough to allow of the complete utilisation of the higher dressings.

As in previous years the alternate half-plots of each variety were dressed with superphosphate. The results are given in the following table:—

Variety	Weight in Tons per acre canes			
	No Nitrogen		With Nitrogen	
	No Phosphate	No Phosphate	With Superphosphate	With Superphoshate
D 118	24.4	27.6	37.5	39.8
D 248	24.3	25.1	34.1	34.1
D 5	19.1	23.7	27.2	28.2
D 108	24.3	21.9	26.7	30.1
D 367	24.2	26.0	31.6	35.1
D 349	19.4	20.4	27.0	27.9
D 239	19.5	22.7	27.2	30.3
D 59	19.6	21.3	30.4	28.6
D 436	17.9	18.5	26.2	27.2
D 570	18.8	19.9	31.2	30.1
D 648	21.0	24.7	24.2	27.4
D 181	27.1	31.3	27.3	34.4
Green Transparent	21.3	24.1	34.0	29.4
D 118	28.0	26.3	35.6	33.1
Means	22.1	23.8	30.0	31.1

The above table shows that the mean gain by the application of superphosphate of lime to plots not manured with sulphate of ammonia was 1.7 tons of canes per acre whilst on plots manured with sulphate of ammona it is 1.1. tons of canes per acre. At the usual prices of superphosphate of lime and of sugar the increase due to the manurings would not pay the costs of the applications.

TRIALS WITH MULCHES OF RICE-STRAW.

Owing to the increasing scarcity of sulphate of ammonia, it is necessary for planters of sugar cane, the yield of which is pre-eminently due to and largely in accordance with the quantities of readily available nitrogen found on the soil and in the manures used, to seek for other and local sources of this important con-

stituent of plant-food. Great quantities of rice-straw are produced in the colony almost all of which are wasted by rice-farmers. For many years,—since 1907—rice-straw has been used in increasing quantities in the Botanic Gardens as a mulching material for fruit trees, economic plants, palms, and other ornamental plants. For this purpose it has proved very successful.

The beneficient effects of the rice-straw are due to three causes—1st its direct manurial action by the addition of nitrogen, phosphoric acid, lime and potash to the soil; 2nd its action in preventing the development of weeds especially those of the order graminae, and 3rd by the large amount of difficulty decomposable woody fibre it adds to the soil resulting in gradually rendering the surface soil lighter and less tenacious and hence of better tilth.

Analyses of rice-straw grown at the Experimental Fields gave the following results:—

	Creole	*No. 75*
Moisture	57.1	57.1
1. Organic Matter	38.1	36.9
2. Mineral Matter	4.8	6.0
	100.0	100.0
1. Containing nitrogen	.26	.35
2. Containing phosphoric anhydrite	.11	.11
„ lime	.14	.12
potash	.80	.86
„ silica	4.29	4.53

An application of 12 tons of rice-straw to an acre adds to the soil the following quantities of the more important constituents of plant-food:—

	Lbs. per acre.	
	Creole	*No. 75*
Nitrogen	70	94
Phosphoric anhydrite	32	32
Potash	214	231
Lime	38	32

The surface dressings of rice-straw over the cane-fields have a well-marked effect in keeping down the growth of weeds if the straw is spread fairly thickly over the beds in which are young canes, or over the land prior to planting it in canes. This action

was very noticeable in our trials, the beds dressed with rice-straw remaining comparatively free from weeds especially grasses, whilst the adjacent beds not receiving any straw became covered with a thick growth of weeds, spurious grasses, etc.

The third action will become more marked after the land has received several successive dressings of the straw, its undecomposed remains gradually becoming incorporated with the surface soil.

The northern portion of the field which was used for this experiment was replanted with the three varieties which have been grown on it for several years past; D 625 occupying the beds previously planted with D 145; D 118 those previously planted with D 625; and D 145 those formerly cropped with D 118.

The canes were planted in June, 1916, and reaped in January, 1918. The average results of the varieties are shown in table VII:—

Variety.	Canes Tons per acre.	Expressed Juice.				
		Per cent, Canes.	Specific Gravity.	Lbs. per gallon.		Indicated Sugar Tons per acre.
				Saccharose	Glucose.	
D 625	42.2	72.0	1.075	1.765	.078	4.96
D 118	33.6	70.8	1.080	1.922	.053	4 19
D 145	29.4	66.6	1.074	1.799	.067	3.31

Table VIII. shows the weight in tons per acre of canes and of saccharose in the expressed juice in the series of plots which were either not manured or which received dressings of 200, 400, and 500 lbs. of sulphate of ammonia per acre respectively:—

	D 625		D 118		D 145		Means.	
	Weight in Tons per acre.		Weight in Tons per acre.		Weight in Tons per acre		Weight in Tons per acre.	
	Canes.	Saccharose.	Canes.	Saccharose.	Canes.	Sacchorose.	Canes.	Saccharose.
No manure	29.7	3.41	25.7	3.24	20.3	2.15	25.2	2.93
Sulphate of ammonia 200 lbs.	34.3	4.01	28.8	3.57	23.9	2.70	29.0	3.43
Sulphate of ammonia, 400 lbs.	48.0	5.57	41.9	5.04	35.5	3.98	41.8	4.86
Sulphate of ammonia. 500 lbs.	52.6	6.10	41.9	5.04	36.6	4.10	43.7	5.08

The average increase due to the nitrogenous manurings were:—

Lbs. per acre Sulphate of Ammonia	= Nitrogen	*Tons per acre.* Canes	Saccharose in juice.
200	40	3.8	50
400	80	16.6	1.93
500	100	18.5	2.15

The relative producing power of nitrate of soda and of sulphate of ammonia when applied in proportions supplying equivalent amounts of nitrogen was similar to the experience of the majority of previous seasons, the ammonia salt producing 4.5 tons more canes or .51 ton more saccharose per acre than did the equivalent amount of nitrate of soda.

Table X. shows the average results of the cross-dressings of rice-straw with the three varieties:—

Variety	Treatment	Yield in Tons per acre	
		Canes	Saccharose
625	No Rice Straw	38.7	4.53
	Rice Straw 25,000 lbs. per acre	41.3	4.93
118	No Rice Straw	30.9	3.79
	Rice Straw 25,000 lbs. per acre	33.2	4.25
145	No Rice Straw	25.9	2.90
	Rice Straw 25,000 lbs. per acre	29.3	3.34
625, 118 145	No Rice Straw	31.8	3.74
	Rice Straw, 25,000 lbs. per acre	34.6	4.17

The dressings of rice-straw produce the following excess yields:—

Variety	*Tons per acre* *Canes*	*Saccharose*
D 625	2.6	.40
D 118	2.3	.46
D 145	3.4	43
Average	2.8	.43

Table XII. shows the results of the dressings of rice-straw on the variously treated plots:—

	Weight in tons per acre canes							
	Without Rice Straw				With Rice Straw			
	D 625	D 118	D 145	Mean	D 625	D 118	D 145	Mean
No Nitrogen	31.1	22.8	19.5	24.4	28.3	28.5	21.0	25.9
Potash only	28.1	25.3	19.2	24.2	32.8	30.1	23.5	28.8
Nitrogen only (200 lb S.A.)	35.7	29.1	19.2	28.0	32.8	28.4	30.2	30.5
Potash & Nitrogen (200 S.A.)	31.1	32.5	25.9	29.8	43.0	34.0	25.9	34.3
„ „ „ (300, 400, 500 lb S.A.)	47.7	34.4	32.0	38.0	48.0	36.7	34.5	39.7

The average increases are:—

Treatments	*Tons of Canes per acre*
No Nitrogen	1.5
Sulphate of Potash only	4.6
Nitrogen only, 40 lbs. per acre	2.5
Sulphate of Potash and Nitrogen 40 lbs. N. per acre	4.5
Sulphate of Potash and Nitrogen 80 lbs. N. per acre	1.7

It appears from this comparison that the gain of sugar-cane may have been largely due to the nitrogen supplied by the rice-straw.

From the results of this first year's comparative trials it is evident that it is worth the while of a sugar planter to make large-scale trials with any rice-straw which may be produced on his estate, bearing carefully in mind that the full advantage of mulching with rice-straw will not become apparent until repeated over several crops.

On several occasions we have pointed out that although our soils are extremely rich in potash there is always a possibility that sugar-cane culivation long continued without any break may result in the readily available potash of the soil being the first soil constituent to show signs of commencing depletion. From certain observations during the preceding series of experiments in this

part of the experimental field we considered it desirable to ascertain if this condition may not be arising there. Therefore a series of the plots were arranged to be manured with sulphate of potash at the rate of 150 lbs. per acre in addition to the usual nitrogenous manurings. The results are given in table XIV:—

	D 625		D 118		D 145		Mean	
	Wt. in tons per acre		Wt in tons per acre		Wt. in tons per acre		Wt in tons per acre	
	Canes	Saccharose	Canes	Saccharose	Canes	Saccharose	Canes	Saccharose
No manure	29.7	3.41	25.7	3.24	20.3	2.15	25.2	2.93
Sulphate of Potash 150 lbs,	30.4	3.62	27.7	3.57	21.3	2.48	26.5	3.22
Sulphate of Potash 150 lbs, S. Am, 200lb	37.0	4.35	33.3	4.13	25·9	2.97	32.1	3.82
Sulph te of Potash 150 lbs, S. Am. 300lb	43.6	5.11	35.4	4.40	3.46	3.91	37.9	4.47
Sulphate of Potash 150 lbs, N. Sod. 375lb	42.4	4.96	32.4	4.09	25.3	2.83	33.4	3.96
Sulphate of Potash 150 lbs. S. Am, 400lb	46.5	5.66	36.7	4.55	35.1	3.96	39.4	4.32
Sulphate of Potash 150 lbs, S. Am. 500lb	59.1	6.94	43.7	5.43	38.2	4.30	47.0	5.56

The average increases in these trials were:—

	Tons per acre	
	Canes.	*Saccharose in juice*
Due to Sulphate of Potash only	1.4	.29
Due to Sulphate of Potash and 200 lbs. S. of Ammonia	6.9	.89
Due to Sulphate of Potash and 400 lbs. S. of Ammonia	12.7	1.54
Due to Sulphate of Potash and 375 lbs. of Soda	8.2	1.03
Due to Sulphate of Potash and 400 lbs. S. of Ammonia	14.2	1.79
Due to Sulphate of Potash and 500 lbs. S. of Ammonia	21.8	2.63

Considering those in conjunction with the results without any application of potash sulphate the gains due to the application of 150 lbs. of it per acre were:—

	Canes.	Saccharose
No. Nitrogen	1.4	.29
200 lbs. Sulphate of Ammonia	3.1	.39
400 lbs. „ „ „	nil	nil
500 lbs. „ „ „	3.3	.58
Mean	2.6	.42

These results indicate that the supply of immediately available potash in the soil has become somewhat depleted so that the nitrogenous dressings as well as the readily available nitrogen of the soil cannot exert their full effects unless aided by applications of potash salts.

ANTI-COCKROACH SUBSTANCES.

1. Sodium flourid was found to be the most rapid killer of roaches of all substances tested. Only 24 hours were required to kill 100 per cent. in cage tests, even when the material was diluted down to 18 per cent. content. Practically 100 per cent. were killed in treated kitchens by the use of a mixture containing 50 per cent. sodium flourid.

2. Borax, unadulterated, and in combination with inert matter wherein there was less than 12 per cent. borax, required from three to seven days to kill all of the roaches in cage tests, proving it to be very slow. Borax, used alone, was only partially effective in kitchen tests.—*U.S. Dept. of Agriculture.*

NOTES ON CATTLE RAISING ON THE COAST-LAND SAVANNAHS.

By John H. Haly, Manager, Abary Cattle Ranch.

This articles does not refer to the hinterland savannahs of which I have no experience. The areas with which I am acquainted are the undrained savannahs which occur immediately behind those savannahs in close proximity to the coast. These coast savannahs possess some sort of a drainage system, usually connected with sugar estates. Drainage would, without doubt, vastly benefit these back savannahs and in the future, should the cattle industry attain any magnitude, such drainage will be necessary.

SUITABLE BREEDS OF CATTLE.

So far as my experience goes, no pure breed of cattle have done at all well on these savannahs and it is a difficult matter to say what pure breed would be likely to suit. Polled Angus have done fairly well but it is an exceptionally intractable ainmal, hard to handle when in a wild or semi-wild state as it has to be roped round the neck which means loss in handling especially during the dry weather. Cattle, no matter how domesticated, soon attain a semi-wild condition when turned loose in these vast tracts of uninhabited country. The high class Short-Horns do not thrive. Such well bred cattle for some generations have been accustomed to every gentle treatment, and are by no means inured to exposure to sun and rain on such land under tropical conditions. Under more domesticated conditions they might do better. In my opinion no strain of Short Horn is desirable on this type of savannah land.

The cattle which do best at present are the creole cattle, and they are, generally speaking, a mixture of all the various breeds that have been imported into British Guiana. Time has gradually evolved a strain which does well under our tropical climate and can stand any amount of rough handling and exposure.

In crossing amongst these mixed breeds no attempt has apparently been made to produce either a beef or milk animal. Amongst our own cattle, with the assistance of the Government

stock, we have been carefully mixing beef and milk types and, I think, getting neither to any extent. My choice of a satisfactory breed is the creole animal crossed with the Zebu, using half bred Zebu bulls and so creating quarter breeds. These are bred back to the Creole say, for three generations, and then bred back again to the Zebu as before. You thus get an animal which from experience I have proved to be ideal for our coast savannahs.

GENERAL MANAGEMENT.

Under such savannah conditions the cattle roam pretty well as they like and very little supervision is required. Three men, mounted of course, are ample for the supervision of a herd consisting of 1,000 head.

During heavy wet weather, when the low lying areas hold water, the cattle will feed in the swampy land during the day and return to the higher and dry land for the night.

No artificial food is ever given for fattening purposes; neither are the steers for market purposes ever separated from the herd. This of course could be done to considerable advantage. Castrations is performed from 6 to 12 months old and the loss is about one per cent. or less. No particular precautions are taken, but the operators and their assistants must know the work very thoroughly. The operation is best performed towards the end of the year after the first showers when the weather is cool. Hot weather causes bleeding.

Castration cannot be performed at the time of year when the savannahs are drying up after the annual rains. This is due to a peculiar local condition. As the water gradually evaporates from the land innumerable fish, which have multiplied during the wet weather, are caught and stranded; their decomposing bodies attract myriads of flies which breed therein. These flies are also attracted to any wounds on the cattle; they lay their eggs in these wounds and the maggots, when hatched, feed therein causing terrible sores which, if located in a vital spot, may bring about the death of the animal. This fly is known to the cattle men as the 'fish fly.'*

Heifers, on good pasture, breed at 2½ to 3 years and continue to breed satisfactorily until they are 12 to 15 years old. They

*Probably *Chrysomia macellaria* Fab It is a common fly in the Colony.—Editor.

wean their calves at 9 to 10 months. Better results could be obtained by not allowing heifers to breed till they are from 3 to 3½ years. Early breeding adversely affects them. No speying or unsexing of heifers is practised. Bulls, I find, continue to give good service up to 12 years old. Steers are best sold at 4 years old when they should weigh on the hoof 750-800 lbs.; the hide from such an animal would weigh from 55 to 60 lbs. and should sell for about $5 (£1. 0. 10.)

Fifty cows are the maximum allowed to one bull in a large herd. Three acres of pasturage is reckoned to each head.

The effect of prolonged heavy weather on such cattle is bad. The percentage of loss among calves is then high; the cattle lose weight and get into bad condition generally. Prolonged drought has no such effect; provided of course, that there is plenty of good drinking water. The cattle seem to thrive even when the grass is scant and dry.

Savannah pasturage is at its best between the breaking up of the dry season and the advent of the heavy rains when the low ground is gradually being inundated. In good years this extends from December to April inclusive.

Cattle on the savannah lands are numbered and generally inspected by round-ups and counting out of corrals or pens.

DISEASE AND PESTS.

The only disease of importance is anthrax, but there is infinitely less of it on these savannahs than on the drained front lands. This is attributed to the periodical inundations which take place. Other ailments common among highly bred stable-kept stock are practically non-existent.

Ticks on the savannahs give no trouble. Flies, whose maggots infest wounds, are troublesome when the savannahs are drying and the fish dying. Castration and branding is therefore not carried out at this time of the year. At this same time cow-flies (Tabanidae) are prevalent and are numerous enough to prevent cows from grazing in the daytime. They do no other harm. 'Mosquito-worms' (Oestridae) give no trouble.

THE ESTABLISHMENT, UPKEEP AND CARE OF A GOOD COLLECTION OF FERNS.

By John F. Waby, F.R.H.S., I.S.O.

Every keen Horticulturist is a lover of ferns, at the same time he is also keen—and must be—on other subjects. Many amateurs are just as keen but they often lack the knowledge of the Horticulturist whose duty it is to konw. The subject of fern growing as a special one needs a lot of study and observation, and those of our amateurs who have made a success of this may well be congratulated, because a goodly number of ferns are "kittle cattle" and need careful handling and treatment. But in the tropics as a rule we do not come across many good collections, very few people there care to take much trouble, and as it is also a question of expense the plants often "go to the wall." Yet there is scarcely anyone who does not admire good ferns, though they may be but of a very few species. One special necessity is provided for by kindly nature, and that is heat.

In the large collections of the "old Country" one meets with all sorts and conditions of ferns, and when the owner of the special establishment provides ample means for making a good collection, he gets it; and in such a case men who are experienced in the culture of these individuals find it a fairly easy matter to keep up such a collection to its highest pitch. Houses are built for the express purpose of providing for tropical ferns, temperate ferns, and cold country ferns, each of which class requires separate treatment. In the tropics amateurs are not content with dealing with tropical forms only but must imitate the proprietors of collections "at home;" specimens are admired and obtained from other collections indifferently, brought from various regions, knowing nothing of where the individuals belong or of the treatment necessary; the consequence is that some of the plants are quite out of place altogether in their environment and fail, causing great disappointment.

Some few ferns are quite at home in the full sun, but they are such as need a deal of moisture and are generally to be found

in places where moisture is rarely failing; such ferns are not the kinds amateurs care for. Others which grow in moist places are beautiful objects but need also a certain amount of shade; others again require dense shade with quite humid atmosphere. Ferns needing special arrangements for their cultivation would only be seen in large collections where all sorts form a part, but special provision means expense which is a matter tropical amateurs try to avoid. Yet when we do come across such collections in a large establishment where money is plentiful they are extremely delightful, and one realizes that here is someone who delights in fern growing and spares neither pains or outlay to accomplish his object. Our colonials are careful with their money and do not mind spending on matters which are profitable, but these are things of beauty and costly, so there is little expenditure on them; they do not even employ a man who knows his work, but are content to push along with a garden labourer more or less intelligent, at a cheap rate, getting information about their pet ferns from any who are willing to give it, perhaps not being well versed in the matter themselves.

The greater number of ferns are inhabitants of light shady positions, only needing sufficient protection to break the direct rays of the sun; others need dense shade; but few of our so-called fern lovers think much of these diversities, they treat all alike both as to shade, soil and moisture. Any one who is really fond of ferns will find out where the specimens belong, what are the conditions under which they best thrive, what soil do they need; and will not be content till these matters are made clear so that success may be possible.

To most fern growers in the tropics expense is a great factor, so as a rule the collections are not large. Usually the collection consists of a few kinds of maiden-hair ferns, and perhaps a few others which are fairly easy to manage, all getting the same treatment because no other is known to them. One could get together a good collection of maiden-hair ferns even, but it must not be forgotten that all these do not come from the same region, or live in similar conditions, and unless these are understood disappointment must follow.

What is known as the common maiden hair fern, *Adiantum tenerum*, is the kind we generally meet with and is the most

useful of all for general decorative purposes; and this is because it is by no means a fastidious plant, will bear more ordinary treatment than any other, and as long as it has fairly light soil and plenty of moisture does well. Some of the larger leaved ferns are similar in their requirements, *A. trapeziforme*, *A. cultratum*, *A. pulverulentum*, *A. peruvianum*, etc., forming good plants for decoration. *A. Farleyese*, which is a large and crisped leaved form of *A. tenerum*,—of which now and then we find some good plants,—is not so easy to deal with. So it is not very common; yet when one can show good plants of this it is always a matter of congratulation. Others also of the maiden-hair type require a little more careful treatment than the common tenerum; *A. concinnum*, *A. concinnum latum*, *A. lucidum*, *A. macrophyllum*, *A. cuneatum*, *A. gracillinum*, etc., all showing in their growth and texture a delicacy not seen in the hardier ferns, showing plainly that they come from places where different conditions exist as to soil and position. The same may be said of the golden and silver ferns, *Gymnogramma; Anemia, Cheilanthes, Lomaria*, etc.; good specimens of which are rarely met with. Even the common silver fern, *Gymnogramma Calomelanos*, which we often find growing wild about our gardens and under plant stages, although it is luxuriant in its self-chosen position, rarely makes a good plant in cultivation. Some of the *Pteris*, *Davallia*, *Acrostichum*, *Asplenium*, *Aspidium*, *Polypodium*, *Nephrolepis*, etc; make good specimens for pot culture and are not so particular as to treatment any more than the common maiden-hair; and yet there are others of these genera which decline to thrive unless under better conditions: the various species must be known to be able to say what to do with them.

Now there is one thing which must be noted in the pot-culture culture of ferns which also applies to many other plants, and that is, the putting of small plants into large receptacles, either pot or tub; a mistake often practised by amateurs. The reason of this being a mistake is that the good qualities of the large quantity of material in the large pot or tub gets enervated long before the roots of the plants can reach it; and so after enjoying that which is next to them, flourishing for a time, the roots find no more good material to enter and the plant begins to fade. To prevent disappointment in this direction, always choose a pot or tub just sufficiently large to establish the plant, then when the roots have well filled the soil

give the plant a shift into one a size larger, i.e., an inch or so, which is quite sufficient, the plant will then go on growing and will soon show that it is benefiting by the change.

Soil for ferns generally must be of a light character, they will not thrive in heavy soil. This is very apparent in all ferns found growing wild; you never find them where the soil is of a stiff loam or much loam of any sort. In the forests the surface soil in which ferns delight is that composed of the constant falling leaves, decayed small branches, pulverized fallen trees, forming a top layer, much of which has been washed into the general soil below by the rains into which the fern roots descend easily. In making up soil for pot ferns this must be imitated; and for general purposes a little fibrous loam may be added to give firmness and a little sand to make it friable, all thoroughly mixed together so that no portion shall contain any of the ingredients by themselves. Old lime or mortar rubble, decayed brick, fine burnt-earth, fine charcoal, and coconut dust are found to be very useful for many ferns and can be used with advantage to their general growth and appearance. Fine ashes from the Rubbish Destructor are also useful but in small quantity.

Peat is the general form of soil used in Europe where it can be easily obtained, but as it cannot be obtained here we have to go to humus, the nearest approach we can make to it. Now, do not let us dismiss the question of loam altogether as an ingredient for ferns; it comes in handy at times for strong growing kinds and a little foundation for many. But loam must be chosen with plenty of fibre in it and this can easily be obtained. Go to any pasture clean of weeds, where grass grows freely; clear away all extraneous matter, cut the grass very short, and cut turf, say 1½ to 2 inches thick; take this home and make a small heap of it turning the grass surface downwards; leave this to mellow for a few months and with the decaying fibres in the turf you will get as good a sample of loam as you can wish; use a small portion of this for the foundation of your potting soil and make it light with the other materials I have mentioned, suiting the quantity of the different materials to the various kinds you wish to benefit according to their individual needs, then you may hope for success. Drainage must have special attention, because although well growing plants need a lot of water it must not be allowed to stagnate amongst the

roots. In potting see that there is a good layer of crocks at the bottom of the pot, with a concave piece over each hole; and should at any time these crocks get the soil washed into them so as to stop up the holes, turn out the plant, clear the crocks, relay them, and turn the plant back into the pot.

Now as to staging; ferns must have plenty of room to develop, they must never be crowded together so that the fronds overlap each other; if they do you will soon see that the leaves (pinnae) will turn brown for want of light and often whole fronds will be destroyed. They need all the light they can get and this is obvious in plants used to decorate dark rooms, the fronds always turn to where the most light comes from and if the plants are left in dark positions for more than a day or two they become weakly, and any growth made there is spindly. They also miss the moisture which they get on the stage. All plants used in rooms should if possible be put outside at night so that they may catch the moisture in the air. The plants should be examined each day,—in every good collection this occurs twice daily,—to see if they need watering; a trained gardener makes this examination by tapping each pot with his knuckles, and by the sound made he can tell unmistakably the needs of the plant; this can also be ascertained by feeling the soil by the tips of the fingers. Each plant should be given sufficient water to soak it through, and if any are found to be very dry give a second soaking; then, when the general watering is completed the plants should be well syringed all over above and below; in hot weather the stages should also be syringed frequently to obtain a general moist atmosphere about the plants.

Just a word about the beuatiful filmy ferns. *Trichomanes* and *Hymenophylum; Schizéa,* and *Lindsaya*, which are beautiful in their own style; all of which are difficult to grow away from their natural habitat, and can be kept only a short time with the best contrivance. Special glass cases must be made for these in which a constant humid atmosphere can be kept up, so unless we can see them where they grow naturally we only see them in Herbaria.

The Fern Rockery. A Rockery gives much more scope for fern growing than pot culture, especially for all strong growing kinds, and even many of the weaker forms do well there in con-

junction with allied species. Of course none of these can be used for decorative purposes except as cut fronds.

The first thing is the choice of position. This must be one fairly well sheltered from strong winds, and there must be arranged overhead shelter from the sun. A light framework on posts,—sufficiently high to be above the heads of visitors—with a few laths or wires running the full length of the structure, just sufficient to hold up a light covering of coconut leaves; these split down the mid-rib and cut the length of the width of the framework, the leaflets all laid one way supported by the ribs giving an even surface above and below, the ribs tied to the laths or wires, their density regulated as required for the protection of the plants beneath. Possibly a position can be chosen under the shade of trees, the lower branches of which must be fairly high so as not to make the shade dense; the breaks between the trees, if any, can be covered with a small framework, if needed. For forming the Rockery stones are needed, large and small; large pieces of course burnt-earth; large and small pieces of an old condemned wall or pieces of old foundations of buildings with the old mortar amongst the bricks or stones; all these in the roughest form obtainable, as no smooth surfaces in these materials are needed. The Rockery should slope from back to front, or from centre to sides; built above the general surface of the ground to ensure drainage; pockets of various sizes being left as it is built, in which the ferns are to be planted; a layer of broken stone, burnt-earth, or similar material being placed at the bottom of each pocket. The soil should be carefully prepared; good fibrous loam, not more than one-third; one half leaf mould; the remainder made up of fine burnt-earth, lime or mortar rubble, and coarse sand, or Destructor ashes; all these thoroughly mixed together. Large-growing ferns should be placed at wide intervals, medium sized alternating, and the smaller kinds beneath and in between, each one having space to spread and develop; here also is a splendid place for the many pretty Selaginellas to creep and cover the whole of the under surface and even the stones of the Rockery. Where there is plenty of room such plants as Caladiums, Aroids, Resurrection plants, terrestrial orchids, such as *Phaills, Bletia, Cyrtopera, Cyrtopodium, Peristeria* and *Spiranthes*, etc., can be used giving a pretty variation all through.

Fern baskets. Ferns grown in baskets to hang from the roof of he fern house or open galleries which are protected from strong vinds and to hang indoors occasionally; are a very pleasing fea- ure. Only a very few species are to be seen used in this form, iut there are several other kinds which can be used in this way. ome of the small Adiantums which have creeping roots; some Polypodiums with creeping roots and stems; some of the Nephro- epis—particularly those with bulbous roots; Lygodiums—the limbing ferns—which can be trained all about the baskets; some f the Davallias with creeping stems; Taenitis, and Vittaria, both piphytic. The baskets must be well lined with moss or fibrous naterial to keep in the soil. It stands to reason that these must e kept well watered, as hanging in the air they are more likely o become dry than when in pots. The best way to water these s to dip the baskets into a bucket or tub of water giving the balls ufficient time to be soaked completely.

Fern pests. Fortunately these are few, yet they must not be ieglected as considerable damage may be done in a short time. Caterpillars are very fond of the tender fronds and these should e searched for daily, if only 1 or 2 are present they play havoc n a few hours especially at night; they are generally so few that ne can but say "catch and kill," they are never so many that there s need of using insecticide. Brown, and star scale, are frequent- y met with, these must be dealt with by spraying with "Rosin ompound" frequently. Mealy Bug makes pale yellow spots n the pinnae, and as it is always on the underside at first, its pre- ence is detected by these spots; spray this frequently with "Rosin ompound" or "Whale-oil Soap."

Rosin compound is made thus; take 4 lbs. of powdered rosin, 3 lbs. powdered Washing Soda, dissolve the rosin and soda by oiling in one gallon of water in a vessel which will hold 5 gallons, eep the mixture boiling and add water up to 5 gallons. This is he stock solution, when cold it should be of a clear brown colour. For use take one part of it to 5 parts of water. Of course a pro- ortionate smaller quantity can be made.

Whale-oil soap. Dissolve in water, 1 lb. in 8 gallons of water or such tender leaved plants as ferns. It has the disadvantage of eing strong smelling, so although it is easily prepared it may not e cared for much on this account.

The most to be feared is a fungoid disease which affects maiden-hair ferns particularly; though it does not confine itself to them. We often notice ferns getting brown on the edges of the pinnae caused by neglect in watering but this must not be mistaken for the disease. The disease emanates from decayed wood in old buildings; it attacks the ferns in a dark brown triangular shape running down the veins of the pinnae, till it covers them completely. Spreading from one to the other till the whole frond is affected. Needless to say, every part affected dies, and if left uncontrolled eventually kills the plant. Every badly affected frond should be removed and burnt. There has been plenty of this disease amongst the ferns in Georgetown which many persons know to their chagrin, so it should be well known. This can be combatted by the use of "Liver of Sulphur," (Potassium Sulphide,) using one oz. to two and a half gallons of water; dissolve the sulphur in a pint of hot water and make up to 2½ gallons. Spray with this frequently. When the disease shews itself it would be as well to thoroughly cleanse the structure in which the plants are growing with carbolic acid solution, taking the plants away meanwhile, also to spray the structure after cleansing with the sulphur mixture. Also after once having the disease amongst the ferns to give them an occasioned spraying with it as a preventive measure.

SUGAR AS A MEAT PRESERVATIVE.

A note in the Queensland Agricultural Journal, April, 1918, draws attention to the employment of sugar instead of salt as a preservative for meat. It is stated that hams may be placed in "pickle," if it possible to so call it, of sugar and molasses. The fresh hams are first well rubbed with powdered sugar, and are then placed in the saccharine solution, and left undisturbed for some weeks. When cooked the meat does not present the red appearance of the brine-cured article, but looks more like fresh pork. The taste, however, is said to be like that of ham, only a little sweeter. It is pointed out that salt absorbs a portion of the nutritive substances and the flavour of the meat, and the more deeply it enters the tissues so much the more deeply does it deprive meat of some nutritive substances of genuine importance.—*Louisiana Planter*.

THE SUGAR CROP OF 1917-18.

By Professor J. B. HARRISON, Director of Science and Agriculture and ROBERT WARD, Agricultural Superintendent.

The total area in sugar-cane cultivation in the Colony during 1917 was 78,346 acres, an increase of 2,602 acres over the area occupied by the crops of 1916. For the crops of 1918, 77,823 acres are under canes being 518 acres less than for those of 1917. The following table shows the areas occupied by the principal varieties of canes under cultivation for the crops of 1918:—

Principal Varieties of Canes, 1917 and 1918.

Area in British Acres.

Variety.	1917 acres.	1918 Acres	1918 Increase.	1918 Decrease
D 625	37,798	36,000	...	1,798
Bourbon	7,403	4,950	...	2,453
Bourbon mixed with other varieties	4,259	7,800	3,541	...
D 145	6,168	5,920	...	248
B 208	5,037	4,550	...	487
D 109	883	320	...	563
Diamond 185	1,429	1,120	...	309
Green Transparent	1,495	1,320	...	175
D 118	1,629	2,710	1,081	...
D 419	1,248	1,370	122	...
Java seedling varieties	302	630	328	...
B 147	113	110	...	3
D 115	217	59	...	158
D 167	107	140	33	...
D 116	144	35	...	109
D 4399	70	46	...	24
D 74	73	42	...	31
B 6450	43	43	...	...
Diamond 37	106	89	...	17
B 376	155	350	195	...
D 4397	35	17	...	18

The relative distribution of the various kinds of cane grown during he crops of 1916, 1917, and 1918 are given in the following table:—

	For Crops of		
	1916	1917	1918
D 625	49.08	48.24	47.9
Bourbon	12.03	9.45	6.4
D 145	8.04	7.87	7.7
B 208	7.92	6.43	5.9
Mixed Bourbon and seedlings principally D 625	6.98	5.43	10.2
D 109	2.28	1.12	.4
Diamond 185	2.09	1.82	1.5
Green Transparent	1.79	1.91	1.7
D 118	1.17	2.08	3.5
D 419	.53	1.59	1.8
Java seedlings			.8
Providence 8			.5
B 376			.4
Other varieties unenumerated	8.09	14.06	11.3
	100.00	100.00	100.00

From the returns supplied by the sugar plantatons the distributions of the various sugar-canes in cultivation for the crops of 1916, 1917, and 1918, according to their origin are as follows:—

		1916	1917	1918
Bourbon and other old varieties		17.2	16.7	13.0
Java		.3	.4	.8
Barbados		9.2	7.1	6.7
British Guiana	Plns. Diamond & Providence.	2.6	2.7	2.6
	Botanic Gardens	70.7	73.1	76.9
		100.0	100.0	100.0

The average yields in tons of commercial sugar per acre of the principal varieties under cultivation for the crops of 1917 as deduced from the returns supplied by the Managers of the sugar-plantations were as follows:—

Varieties of Sugar Canes	No. of Plantations reporting		Areas in acres		Tons sugar acre	
	1916	1917	1916	[illegible]	1916	1917
D 419	16	11	349	615	2.28	2.15
D 118	13	16	710	1,227	2.02	1.99
Green Transparent	7	8	424	468	1.73	1.98
D 625	33	31	26,614	21,222	1.73	1.81
Mixed*	14	18	3,401	7,111	1.76	1.78
D 145	22	20	4,901	4,747	1.64	1.72
D 167	7	6	63	1,486	2.18	1.71
Bourbon	23	21	6,262	4,582	1.76	1.69
Diamond 185	5	5	1,475	1,354	1.79	1.62
D 109	12	9	709	442	1.62	1.32
D 208	18	12	5,210	4,352	1.58	1.31

**Principally Bourbon and D625 with some D 109, D 145 and B 208.*

The results of large scale field trials with other varieties are shown in the following table:—

Variety	*Tons Sugar per acre*
D 721	3.34
D 433	3.33
D 121	3.30
D 491	3.11
D 635	3.03
D 246	3.00
Diamond 581	3.00
Albion	2.79
Sport 625	2.78
D 199	2.72
Chrystallina	2.70
Java 72	2.57
D 101	2.55
D 165	2.53
R.P. 73	2.45

B 3954	2.43
R.P. 23	2.38
D 538	2.36
D 520	2.33
D 65	2.28
D 44	2.27
D 754	2.23
D 305	2.22
Diamond 37	2.17
D 405	2.14
Java 100	2.12
D 651	2.08
R.P. 21	2.07
Java 4	2.04
D 216	2.02
Java 247	1.97

THE DAIRY FARM IN BRITISH GUIANA.

BY A. E. BRATT, Manager, Plantation Providence.

The site of the Farm should be within easy distance of, ar in close communication with, a good market. It should exter over an area of at least 100 acres, the majority of which should l good grazing land. A portion of this, perhaps 25 acres, should l be reserved for your Dairy Farm proper; the remaining 75 acr should be enclosed by wire fencing divided into equal portio connected by suitable gates so that the grass of any particul portion can be allotted to your milkers, cows in calf, or for a bu run. The land would be better if kept under two or three inch of water for a period of some months two or three times a ye as dry grazing soon gets under a heavy growth of underbush ar in time would be useless for the purpose you intended it fc This area can accommodate and graze with care, 72 anima The 25 acres reserved for your Dairy Farm proper should well drained and after selecting the site for your Dairy Buildin calf pens etc., the remainder should be wired and enclosed for t

purpose of growing and providing suitable grasses for your use within easy reach of the pens. A good supply of water is most essential and should be near at hand not only for drinking purposes but for washing both cattle and pens.

Dairy Buildings and Sheds—A well constructed building with close-boarded galvanized roof, well ventilated, providing for plenty of air and light and yet rain proof, with a concrete floor space of 85′ by 30′ should be erected for your milkers. A building of this size can accommodate 24 animals. The floor space should be protected by 2″ G.H. planks raised 4″ to 6″ above the level of the concrete and divided into twenty-four stalls 12 on each side, each stall 7′ wide by 10′, passage-way between, provided with suitable gutters on either side leading into your manure pit. A building of this description may cost $800 to $1,000 ($1=4s. 2d.)

Choice of Cattle in Forming Your Herd:—The local bred cows on which the majority of Dairy Farmers are compelled to fall back on for their stock is none of the best. Years of bad crossing, in-breeding and poor food have left their mark on the majority, but here and there one can purchase an animal that has not suffered so much in these respects, and one that would, with some care and attention, well repay the owner for her outlay in time and money. The price for a cow of this description may be $80 to $100 and the yield of milk not more than 16 pints a day. They are cheaper to keep than imported cows, require less care and attention, are hardly and liable to fewer diseases, and can be put to pasture between periods of calfing thus incurring no further expense than agistment fees. Dairy Farmers have the choice of either buying cows of this description or, if they have the necessary capital, of importing from abroad better bred stock than they can buy locally. The best cows for importation are those from Barbados ; these cattle soon get acclimatised to our local conditions and are a great improvement on local stock. The price in Barbados varies from $100 to $150 each, and the yield of milk from 24 to 30 pints a day. The supply of milk however soon falls off by 25 per cent. on arrival here due in a great measure to the poor quality of local food. The stock nevertheless is well worth importation. On the other hand local stock, crossed with

an imported bull of good milking strain, is also well worth the time and trouble.

The progeny of these in some cases have been known to increase their supply of milk as much as 50 per cent. over and above that of the parent stock, or yield a supply of milk equivalent to that given by imported cattle. The best age to purchase your milkers is between their 3rd and 4th years or between 2nd and 3rd calving. The points you should look for in chosing your cows are a large udder, a long and deep frame, a long head or good distance between eyes and nozzle.

You would require 12 milkers to start your Dairy, gradually increasing your stock to 24 or more as the case may be, a smaller number to begin on would not be remunerative when it is considered that the cost in upkeep for 24 milkers is very little more than it would be for 12.

Bulls—I think I am right in saying that Short-horn Stock have been the most popular breed in Great Britain for a number of years. They have represented the standard by which most other breeds have been measured. The pure bred Short-horn bull has been in demand by foreign buyers for a number of years, and large numbers having been exported to South America for breeding purposes. These bulls invariably fetch high prices, £1,000 being quite a usual figure for prize bred stock. They are good beef-making animals as well as good milkers. This is the breed of imported cattle I consider most suitable for our local needs and the one that has given less trouble and has thriven best in this colony. The Board of Agriculture has gone to considerable trouble and expense in importing pure bred stock of this type. A well bred bull of this description can be purchased at any annual Government Sale held generally in February of each year at what I consider a ridiculously low figure when one considers his pedigree and the cost of importing the strain. In choosing your bull you should insist in your purchase having a broad head, good girth, plenty of depth, an even line, well filled hind quarters, a clean nose, the latter being a sure indication of a well bred animal of this type. Your bull should not be allowed to run with the cows, and should be replaced every 3rd year to avoid in-breeding. It is now customary in Great Brtain to put Short-horn heifers to the bull at 15 months old but there the conditions are

vastly in favour of the young heifer developing under the circumstances into a normal size sow at calving at 2 years old; here everything is against this and your heifers should not be put to the flock before they are $2\frac{1}{2}$ years old or older.

Food Local and Imported:—Too much stress cannot be laid on the importance of the quantity and quality of the daily supply of food, for, on it depends in a great measure the supply of milk. Locally we are not altogether badly situated as regards the grasses available, there is plenty of variety to choose from, but as a milk providing class it is quite another matter. Country Dairies would be better situated in this respect than those near a Town as the best local grasses available are the succulent ones growing near and about our canals.

Dairy owners should improve their supply of milk-producing grasses by planting the varieties "Imphee" or "Ifee" and guinea corn, seeds of which can be imported directed from Barbados or through the Board of Agriculture. These seeds take 8 weeks to germinate; the plants ratoon well and only require renewing each year. These two varieties produce a heavy tonnage of leaf per acre and yield six crops a year on fertile soil. They are excellent food; better than any local grass for improving and keeping milkers in good health and condition in addition to inducing and increasing the flow of milk.

If you are thinking of taking advantage of the opportunities at hand to sow suitable grass in rows of equal distances apart so that the soil between the rows can be tilled, you will find the 25 acres near your milking sheds most useful as an effective and cheap means for supplying yourself with green food. Any man accustomed to use a scythe can cut 700 lbs of grass a day, if the conditions are favourable and your supply will be on the spot in easy distance of your pens. You can here get rid of all your pen manure to advantage to yourself in a cheap and effective way by ploughing it under between the rows by means of a small disc plough.

Of artificial or imported food, Oilmeal is the most valuable. All, or most all, imported peas known locally as " dholl " can be used to advantage. Rice and Corn meal are also good substitutes and can be procured locally.

Treatment of Herd—A good policy to adopt is, after milking and watering in the early morning, to put your cows out to pasture for grazing and exercise, bringing them in by early mid-day for feeding as they graze little during the heat of the day and would be the better for being under cover by noon. They should be fed and watered three times a day and, if necessary, milked three times a day as well. The amount of food each cow consumes during a day varies little ; a generous meal being 10lbs. Oilmeal or its equivalent in Dholl, Ricemeal, or Cornmeal, with 75lbs. of green fodder of the varieties recommended. The amount of fluid that can be consumed is large, 12 to 16 gallons in the form of mash or otherwise is none too much for a normal sized cow in good health to take during a hot, dry day. Each stall should be provided with an 8-gallon wooden pail to ensure that the animal gets its full supply of fluid. Molasses should be freely mixed with the cows' drink. It has certain food values and is of use in assisting to keep the animal in good health and condition. Care should be taken to observe that each animal takes its daily quantity of fluid; your 8 gallon pail will be found useful here in supplying you with this information ; any refusal on the animals' part in this respect invariably leads to the supply of milk falling off and in these cases your Vet should be at once called in.

Treatment of Calves.—Our local milk-men, the majority of whom are East Indians, will, I am afraid, never be trained to the system of weaning the calves a day or so after they are born; not only will it be found difficult to get them to take to the new customs but it will also be found unlikely to get local cows to give down their milk without nursing the calf. Local habits and customs are too strongly ingrained in both. There is, then, no other course but to follow the general custom and allow the cow to nurse her calf and for the sake of the health of the young one, if the breed is valuable and worth keeping, to only draw milk from 3 teats leaving one entirely for the calf's benefit. The calves should be housed and penned by themselves in extension sheds off the main building, care being taken to avoid over-crowding; they should be separated according to age so that the older and stronger ones are less likely to make life uncomfortable for their younger brothers and sisters. Young calves will eat or nibble and drink frequently between milkings and a pail of mash consisting of oilmeal or rice-

meal, not too thick but rather on the thin side, should be kept all day in the pen in which they are confined. A run in the open for an hour twice a day should be given. Calves soon learn to eat and when this happens they should be given grass in small quantities frequently to avoid waste.

Health of the Herd.—The Vet's service should be seldom required provided ordinary sanitary conditions are observed and care and attention paid to food; bearing this in view the health of your milkers should cause you little trouble, calving time is the most anxious and the mother should be given double the exercise she usually gets during the month prior to calving. The Vet's services should be taken advantage of at once should any trouble occur during this period. Parasites, ticks and lice, are brought about chiefly through dirty unsanitary conditions. It follows that with a good supply of water your cows and pens should be washed daily, using soap and water on the former, in fact treat them as regards sanitation and cleanliness as you would yourself, even to bathing three times a day.

Sale of Milk and General Management.—To make a Dairy a financial success you must run it on proper business lines, keep accounts; a milk book in which the name of every milker should appear and the return of milk from each carefully tabulated. In fact a carefully kept ledger showing a debit and credit side should be supplied for each cow showing a record of its life and the stock it was bred from on both sides, also its record from weaning to calving and calving again as it is very necessary to know, from a financial point of view, when a cow is paying for its keep or not, and by how much as there should be a fixed margin of profit below which you should not go. It is a well known fact that well bred stock eat less and cost less to keep than inferior bred animals.

A depôt and sales room, or several, as the case may be, should be opened in the centre of your market, and milk sent there for distribution in well secured or locked cans. A house-to-house delivery can either be undertaken or the milk delivered to your customers direct from the depot. Butter and Cream-making should be part of your Dairy and this should be carried out on the Farm directly under your control.

NOTES ON CAPONIZING.

By A. A. Abraham, Senior Agricultural Instructor.

No special attention is given to the care and management of poultry in the colony; neither are any efforts made at establishing an industry on a sound and profitable basis; the rearing of fowls upon farm lines would form a paying adjunct on a well-managed grant or homestead. In this article I wish, however, to deal more especially with caponizing.

On farms and homesteads, and even in city lots, there are always a number of cockerels which are allowed to grow into roosters; these subsequently become a nuisance in the poultry yard, both to the annoyance of the hens and a hindrance as regards the production of fertile eggs. After a couple or more years, these fowls are offered for sale as table birds, at an age when they have grown tough and unpalatable. Therefore, all surplus cockerels should be converted into capons, which will grow into plump, fleshy and very palatable fowls suitable for the keenest epicure.

Most farmers and poultry-keepers do not know what a capon is. A capon is a cockerel which has had its reproductive organs removed when about 2 months old.

I will now deal with the mode of operation. The cockerels selected must not weigh more than two pounds or not less than 18 ozs. At this age of development their testicles and attachments are just the right size for removal and, when correctly done, there is no danger after they are extracted.

When you have secured the cockerels of the right size and age it is necessary to be in possession of the right tools. The best are those known as—"George Benoy Capon Set No. 10." This set gives every satisfaction and has always been used by the writer and others in the North Western District. The set of tools is put up in a card board box and is made up of the following instruments:

- 1 Automatic Remover.
- 1 Spreader.
- 1 Operating knife.
- 1 Combination hook and probe.
- 1 pair hooks and cords.

For the beginner it is absolutely necessary to practice on a dead cockerel so as to be able to locate the testicles and their attachments, also to gain some experience before commencing on live ones.

After the tools, the next essential is an operating table. An empty barrel turned on end suits admirably. The cockerels to be caponised must be penned, without feed, for at least 36 hours. This is necessary in order that the intestines be emptied to allow the testicles to come right into view when the incision between the ribs is made and also to let in a good supply of light.

The cockerel is placed in position on the top of the barrel or operating table by tying a weight to each end of the cords and then wrapping the other end of one cord around the legs and fastening with the hook. Wrap the other cord around the wings at the second joint and fasten with hook. Now stretch the bird out as far as possible so that the weights would hang down on each side of the barrel.

Damp the feathers in front of the hip joint and pluck them out. You will then be able to easily locate the last two ribs. Place the blade of the operating knife between these and draw it forward with a firm downward pressure, entirely separating the ribs. The cut should not be made longer than one inch. If made longer it would result in an ugly wound. When the cut is made, and there happens to be a slight flow of blood swab up with a piece of cotton wool. Now insert the spreader to keep the ribs apart. The thin membrane seen covering the intestines must be opened with the hook. If the bird was properly starved, as soon as this membrane is cut, the organs will at once be seen. Each testicle is a small, yellowish object about the size of a pigeon pea situate against the back bone.

The instrument, which next comes into play is important; it is the Remover. Insert this, holding the loops tightly together; gently push the intestines out of the way if necessary. Now put the loops over the testicle, and allow it to shut gradually with the testicles inside the loops. In grasping the organ every care must be taken not to cut or in any way injure the artery which is behind the organ otherwise the bird will bleed to death. Turn the instrument round and back a couple of times in order to lossen the

testicle, then twist round and round, drawing, at the same time, the parts towards you so as to stretch the cords and eventually sever them with the testicle half way between the organ and back bone. This completes the operation on the one side. To remove the other testicle, turn the bird over and repeat the operation exactly as in the first instance. If the work is carefully done, when the bird is let free, it would appear as though nothing had happened to it. There is no need to sew up the cuts. These heal up in a very short space of time and is no discomfort to the birds.

As soon as the birds are finished with they will be ready for food and water. Place plenty of clean fresh water before them with a grain or two of permanganate of potash in it, just sufficient to colour the water. Then enough corn or cold food as they can clean up.

After the capons are let loose, it will be observed that a few or all of them have developed a swelling on one or both sides. This is nothing serious, it is only wind getting under the skin, all that is needed is to prick the skin and press it gently to let the air out. After this, there is no further trouble. Well-fed capons put on weight at an average of three-quarter lb. per month.

The art of caponizing can be made a source of profit and it is hoped that this article will stimulate a keen interest among farmers and poultry keepers to rear as many cockerels as practicable in order to start an industry in capons.

When further information is required on the subject, enquiries can be made through the correspondence columns of this journal, and the writer will be pleased to answer such, for the benefit of anyone.

GARDEN, FIELD AND FOREST.

"*The Cabbage Palm.*—Some uncertainty has been expressed by writers as to whether the cabbage palm of this colony, which is found abundantly along the sea-board, but chiefly on estates and in the towns, and which as freely reproduces itself as any other parts of the vegetation, is really native of the colony or not. Practically its presence may be said to be confined to the coast region, for it is not found very far up the rivers, and wherever it is so found the circumstances of its growth show that it was first carried there by man. The fact, however, that it is not found plentifully very far in the interior is not in itself evidence of its foreign origin, for it might possibly be a littoral species, restricted, as most littoral plants are, from any considerable range inland. But that it is not so restricted in range its healthiness and spontaneous reproduction wherever found on the banks of the rivers is evidence. Guiana seems to possess, however, no truly littoral species of palm, and no indigenous species that reaches in its strictly natural range quite down to the sea-board. The cabbage palm (*Oreodoxa oleracea*), has been known now for two hundred years, as common nearly or quite throughout the West Indies, extending from the Bahamas, through the chain of islands which form the Antilles, to Trinidad, and it was a question whether the latter island really terminated its natural range, or whether, as seemed most likely, it extended still onward through Venezuela to Guiana. This seems, however, not to be the case. In one of the "Chapters from an Old Work," by Colonel St. Clair, who served here as a subaltern in 1866, which lately appeared in the Argosy, it is mentioned that the cabbage-palm was sent here from the West India islands to Mr. Wills, a planter of that day, at Parica point on the east bank of the Essequibo, where it was seen by St. Clair, who called it the cultivated cabbage tree. If this was its first introduction, it has spread considerably in the time that has elapsed, less than a century, and the largest trees about the colony, presumably the first offspring of the originals, may be taken as from 70 to 80 years old. Possibly the originals still exist at Parica. There are now two varieties in the colony, as distinct in external habit and

appearance as if they were two different species ; but when, or where, the second originated I have no knowledge, and I believe I was the first to detect it among the cabbage-palms of the colony. A species of *Euterpe*, which is, in popular estimation, confounded with the cabbage palm, is found in Georgetown, the identity and origin of which are, likewise, unknown."

"*Pruning Vines.*—This operation should be done now by those who have not already performed it. The lateral shoots ought to be cut back, leaving only too well-developed buds near the base of the previous year's growth. It is always a safe plan to leave two, though only one is really necessary, for, if anything should happen to destroy one, the other is available to take its place thus, saving any blanks that might otherwise occur ; but as soon as the best shoot is secured, all the others should be picked off as they appear, so as to throw all the energy into those reserved. All the shoots ought to receive the same attention, except the leading one, which requires in the case of young vines that are still being extended to be somewhat differently treated. But with old vines, on which no special training has been practised, the usual case here, the above treatment would answer more or less for all the shots.

The proper time for pruning the vine back is after it has produced its fruit, and the wood of the young shoots or growths is well ripened. Abundance of air and light are required to ripen the shoots, a condition which is most essential. If the new growth of the vine be well ripened, properly pruned, and there is careful management afterwards, better results will be obtained than if it be allowed to grow without careful pruning and attention. If I am not mistaken, I believe the general practice in Demerara is to prune as the new moon appears, as the sap is supposed to be in a more vigorous state then ; and so much is this idea trusted in, that, if by any means, the cultivator were prevented from carrying out his intentions at the time, or soon afterwards, he would think it better to wait until the following new moon before performing the operation. Well, the question might be asked, are the vines not thrown back a month or so in growth by the practice ? For I believe, when the vine has once started in growth, the sap will continue to circulate until the growth has

matured. This being so no time ought to be lost in pruning when the operation is required, whatever stage the moon may be at. To obtain both in size and flavour, good fruit careful attention to pruning, I must repeat, is absolutely necessary. Otherwise the shoots will be numerous, inferior in strength, and unable to support good bunches. Rich feeding with restricted growth will lead to the production of heavy crops of good fruit. Successful vine culture requires the greatest care and attention on the part of the cultivator.—R. WARD."

" *Tamarind Drink*—A good change or substitute for lime drink in hot weather such as of late we have had is made from preserved Tamarind fruit, though it is not commonly used, and is never seen at public places where cool drinks are supplied. The fruit is plentiful, so may easily be procured for the purpose, the only one to which it is applied. To make the preserve, gather or procure as much of the ripe fruit as is required for the quantity to be made. It may be preserved in large or small vessels. Having obtained the fruit and removed the outer covering, fill the vessel with it. An open-mouthed bottle or jar in which a table spoon can be easily inserted in taking out the preserve is, perhaps most convenient for the purpose, but if it be required in large quantity a keg or small barrel will serve best. After the fruit has been placed in the vessel, take sufficient sugar to cover it, which melt on the fire, only adding sufficient water to make it dissolve. Pour the syrup thus made while hot over the fruit, quite immersing and covering it Allow the contents to cool then cork tightly, and put away for future use. On sugar estates, when making a large quantity, the first syrup used is poured off again and replaced by fresh, in which the fruit is left. This is said to take away the slight astringency the preserved fruit possesses but where the waste of syrup a consequence, a very good preserve may be had without changing the liquid. A table spoonful or two, as individual taste may suggest of the preserved fruit will make a large glass of tamarind drink. With some people it acts beneficially, being slightly aperient.

Mr. William Barclay informs me, with reference to the note on the subject which appeared on the 24th ultimo that it was the custom years ago, when the drink was in more common use than

now, after shelling the tamarinds, to dry the fruit spread out in the shade, for a week or ten lays, before applying the syrup and that a better preserve is made in this way, due to the evaporation of the moisture which the fruit contains when opened fresh.—Another correspondent, writing from personal experience says : "Tamarind drink made with cold syrup will be turbid, a mistake often made in the colony, but if made with cold syrup, as is done in Barbados, it will be perfectly clear. Tamarinds ought not to be *over* ripe when used."

BOARD OF AGRICULTURE LIVE-STOCK.

There appears beneath a statement relative to the live-stock controlled by the Live-stock Committee of the Board of Agriculture. This Committee, which was formed in June 1916, consists of the Chairman of the Board of Agriculture, the Deputy Chairman, H. E. Murray, Esq., the Government Veterinary Surgeon, with co-operative members, the Auditor General, the Inspector of Prisons and the Superintendent of the Alms House.

Total Stock on hand 31st December, 1917.

	Ordinary.	Half-bred.	Pure-bred	Total.
Horses	—	—	—	Nil
Mules	—	1	—	1
Donkey Jacks	8	—	1	9
,, Mares	10	—	—	10
Cattle, bulls	—	1	3	4
cows	7	17	5	29
bull calves	3	17	2	22
heifer calves	8	23	1	32
Buffaloes, bulls	—	—	7	7
cows	—	—	12	12
bull calves	—	—	12	12
heifer calves	—	—	7	7
Swine, boars	—	—	5	5
sows	6	6	10	22
piglets	—	25	—	25
Sheep	—	57	2	59
Ducks	21	—	—	21
Fowls	15	—	49	64

Distribution of Stock on hand 31st December, 1917.

	Botanic Gardens.	Ondg. Farm.	H.M. P.S. Farm.	Lunatic Asylum Farm.	Total.	Remarks
Horses	—	—	—	—	—	
Mules	—	—	1	—	1	
Donkey Jacks	4 (1)	2	3	—	9	
,, Mares	—	6	4	—	10	
Cattle, bulls	1 (2)	1 (3)	2 (4)	—	4	
cows	3 (5)	13 (6)	13	—	29	
bull calves	4	6	12	—	22	
heifer calves	1	17	14	—	32	
Buffaloes, bulls	4	1	2	—	7	
cows	—	8	4	—	12	
bull calves	—	6	6	—	12	
heifen calves	—	4	3	—	7	
Swine, boars	2 (7)	1 (8)	—	2 (9)	5	
sows	4 (10)	7 (11)	8 (12)	3 (13)	22	
piglets	5	—	—	20	25	
Sheep	—	59	—	—	59	
Ducks	—	21	—	—	21	
Fowls	—	60	4	—	64	

FOOT NOTE.

(1) 1 Pure Bred Stallion
(2) 1 Pure Bred Guernsey
(3) 1 Pure Bred Guernsey
(4) 1 Pure Bred Shorthorn
(5) Pure Bred Guernsey
(6) 2 Pure Bred Guernseys
(7) 1 Pure Bred Berkshire
(8) { 1 Pure Bred Tamworth
1 Pure Bred Berkshire }
(9) { 1 Pure Bred Tamworth
1 Pure Bred Berkshire }
(10) { 1 Pure Bred Berkshire
2 Pure Bred Tamworth
1 Pure Bred Poland China }
(11) 3 Pure Bred Berkshires
(12) 2 Pure Bred Tamworths
(13) 1 Pure Bred Tamworth

BOTANICAL NOTES.

SOME INTERESTING SPECIES OF PALMS.

Latania. These are diœcious palms, i.e. the sexes are borne on separate plants. The general appearance of the plants of both sexes is so exactly alike that it is impossible to tell to which sex a plant belongs till it produces its spadices. There are but 3 species in this genus, all bold, handsome plants, belonging to Mauritius group of Islands.

L. Loddigesii the "White palm" of Mauritius. Stems rather stout with a large head of broad, heavy, fan-shaped leaves, crumpled, distinctly grey; the segments deeply cut, rigid; leaf-stalks very stout, thickly coated with a whitish mealy substance. The spadices are produced in great quantity among the leaves, very strong, with simple branches in groups on the main stem. On the male spadices the branches are like huge catkins; the flowers *small, bright yellow, set closely together, and when they fall small* holes are left in the branches. On the female spadices the flowers appear like large knobs with imbricate scales. The spadices of both sexes remain on the plants for a long time, in fact till they decay. The fruit is about the size of a good English plum, or small pear; when these, or the unfertilized flowers fall off, the cup-like calyses are left on the branches. The seeds are peculiar, boat-shaped, with raised markings on the rounded side. As young plants they are especially pretty objects and much sought after for ornamental use, the leaf stalks, ribs and edges of the leaves are red, which colouring disappears in old plants.

L. Commersonii. This is very similar to the foregoing species lacking the peculiar grey colouring, but retaining the red ribs and edges of the leaves in the older plants which specially distinguishes it from its congener. All the first plants of these palms were received from the Royal Gardens, Kew; there was but one plant however of *L. Commersonii*, and that proved to be a female. There being but one plant was most unfortunate as it would be impossible to propagate and extend the species without both sexes. However this one female plant proved to have been fertilized, as perfect fruits were formed, and this could only have been accomplished by pollen wafted across from a plant of *L. Loddigesii*, of which there were several. The fruits were closely watched, and

when ripe the seeds were sown; several germinated, were specially marked and watched; when large enough these were planted. The plants of this genus growing at the Band Stand of the Botanic Gardens, and one in the oval were from these seedlings, but they one and all partake of the full nature of the male parent. There are however two fine plants in the Avenue belonging to this batch of seedlings, which carry the distinctive marks of the female parent.

L. Versachaffeltii. There is but one plant of this species in the Gardens, planted in the oval, a female. This has the general appearance of the genus, but of a looser character and of a yellowish tinge, from which its first specific name of *aurea* was given. This has fruited several times but no fertile seeds have been obtained.

Borassus flabellifer the "Palmyra palm" of Tropical Africa, largely cultivated in India. It bears other vernacular names, such as; Bab, Brab, Brab tree, Debeb, Loutar, Panna-Maram, Tad, Taddi, Tal, Tala, Tark, Tatti-Chettu, Targola, Trinragan, Toddy-palm, Noorigpoo. Carimpana, (the female form), Ampara, (the male form); and the wood is known as Palmyra-wood, and Nutmeg-wood. This is another dicecious palm, and till the spadices are produced both sexes are exactly alike. It is a tall, strong-growing palm with a fairly large stem. Before it begins to lose its leaves it is rather a handsome plant up to about 12 to 15 feet high, furnished all over with large, rigid, heavy, fan-shaped leaves, crumpled, pale green, the point turned under and backwards; the segments cut to about one-third of the depth of the leaf. The spadices are borne among the leaves, similar, to those of the Latanias but much thicker and less branched. The fruit is of the size of a small coconut; there are two varieties, one in which the fruit is of a shining black colour, and the other brown. The seeds are large, of a depressed heart-shaped thickly coated with long strong fibre. In the fresh ripe fruit the fibre is embedded in a strong-smelling greasy matter. East Indians are very fond of this fruit which they suck dry of the greasy matter and it is frequently asked for to use medicinally. Mats, baskets, umbrellas, and books are made of the leaves; sugar and spirits are obtained from the spadices; the wood of the stem is used for making pretty ornamental boxes—J.F.W.

REPORTS OF THE MONTHLY MEETINGS OF THE DISTRICT FARMERS' ASSOCIATION

ABARY FARMING ASSOCIATION

The monthly meeting of the Association held in Catherine-ville Wesleyan Church, Monday, 16th Sept. 7.30 a.m. The Rev. E. R. O. Robertson, President, all the other officers and 27 members present.

Members discussed the prospects of the Rice crop. Several reported heavy financial losses owing to heavy rainfall and the subsequent drought. President suggested that members should consider the advisability of securing an Irrigation pump from Messrs. Sandbach, Parker's for next year's crop. Meeting decided that idea was good but unworkable as farmers' plots were in the rear of Abary lands.

Mr. Pollydore, V.P. raised question of urging Government to initiate irrigation and drainage schemes. Decided to agitate until Government moved to action. Majority of members joined in a discussion as to necessity of enclosing certain parts of the village for rearing stock and grazing cattle. Resolved to submit the matter to Mr. Bellamy, Inspector, and to start a piggery next year.

Meeting discussed high prices of foodstuffs. It was decided to await appointment of Mr. Shankland as Trade Commissioner and Director of Co-operative Societies and to discuss the starting of a Co-operative Grocery on a small scale.

President informed meeting that the Government had definitely decided to appoint Mr. Shankland and matter would be discussed at the Annual Sessions. Decided to write Messrs. Ogle and McArthur to support Government.

Meeting passed vote of thanks to Colonial Bank for financial assistance to increase acreage under cultivation. Members reported that all would be able to meet liabilities and save something. Next meeting fixed to receive subscriptions. Members expressed thanks to President for his services and decided to show same in some tangible way. Meeting closed at 8.30.

MAHAICA-SUPPLY FARMING ASSOCIATION.

Monthly meeting of Executive Committee held at Mahaica, Wednesday, Sept. 11th, at 8.30. Rev. E. R. O. Robertson presided. President read correspondence from Mr. H. E. Murray, Attorney of Pln. La Bonne Mere, re scale of payment for farmers' canes. Committee considered terms very unsatisfactory and lower than any ever offered in the worst days of the Sugar Industry. Decided to reject offer and to meet Mr. Murray with a view to arriving at a compromise. Committee considered the grievances of Mary's Hope cane-farmers and agreed farmers were justified as the estate had done nothing to redeem its promises. President said that the future of cane-farming in the district was gloomy and unless planters showed greater sympathy, the results of two years' work would be all in vain. Decided to invite La Bonne Mere management to dig the middle walks for transporting canes. Committee learnt that Mr. D. Haynes would be Farmers' Chemist at La Bonne Mere to watch their interests. Rate of remuneration was not discussed. Members reported that the canes in the new polder were doing badly and the growth was exceedingly poor.

President reported that Mr. Syfox who, was appointed to attend the Gardens to receive the new cuttings had failed to go and owing to his presence at Mahaicony no other arrangement was made. Meeting expressed its regret. President informed members that grinding would take place early in November. Owing to the high price of labour decided to insist upon the farmers co-operating to cut each other's canes.

The position of farmers outside the Association was discussed. Decided that the Association should not be made a tool by them.

The Committee considered the question of the improved drainage to Supply Village, and expressed thanks to Mr. W. E. Bellamy, Inspector of Districts.

Resolved to support agitation for the irrigation and drainage scheme for Mahaica Creek. Meeting heard reports of losses to rice farmers with deep regret.

Meeting adjourned to Friday 20th September.

HAGUE, WEST COAST AGRICULTURAL ASSOCIATION.

The West Coast Agricultural Association at Hague, West Coast Demerara, held its monthly meetings regularly during the past quarter, July-September 1918. The President, Mr. A. D. Hack, could not be present at meetings in July and August when the Hon. Sec. Rev. W. A. Deane occupied the chair. Mr. Jas. Low. who was the treasurer of the defunct Association, paid in the amount of $8.32 to us ; the membership is increasing gradually while the practical side of the Association is being developed. The Hon. Secretary is in communication with Mr. I. Smith of Vergenoegen, W.C., who is negotiating with Mr. R. Strang, Manager and Attorney of Pln. Uitvlugt with a view to cane-farming, etc. being established.

We have on roll thirty-two members, the majority of whom are farmers. The Association is active and is serious in its efforts to obtain a plot of land aback of Hague for the cultivation of ground provisions.

During the quarter we were compelled to appoint a Deputy Chairman. The Rev. Eric R. O. Robertson, Hon. Secretary of the B.G.T.A. and a worthy member of the Board of Agriculture is unflagging in his efforts in stimulating us.

PORT MOURANT—ROSE HALL FARMING ASSOCIATION.

A Committee Meeting was held in St. Joseph's Schoolroom, Port Mourant on Wednesday evening 11th Sept. 1918. The Revd. T. Wilkes, President, presiding. Those present were Messrs. J. A. C. Read, D. W. Fingal, Jas. Kattick, A. A. Martin, E. J. F. Read, W. A. de Mendonca, Treasurer and W. W. F. Sullivan, Secretary.

The minutes of the previous meeting were read and confirmed. The Secretary reported that no reply has been received from Rose Hall Village Council anent the communication forwarded on 10th June last. A resolution was passed recommending the Village Council to apply to the Local Government Board for a loan to carry out effectively the system of drainage and irrigation

in the district, so as to afford better facilities to the farmers to develop their interests in Agriculture.

Letters from Rev. E. R. O. Robertson, stating that our application for Affiliation to the Board of Agriculture has been granted, and from Mr. E. McL. Ogle, asst. Secretary of the Farmers' Conference re support of Conference were read.

A lively discussion ensued with respect to the holding of a Farmers' Competition in the month of December, which had been arranged for since February last.

The Rose Hall representatives considered that the farmers in their districts were not capable of competing with those at Port Mourant where there is an abundant supply of water at present, despite the fact that there has been no rain since July 31st.

The President considered that it would be a breach of faith, should it be postponed. The meeting then decided to close the entries on 15th Nov. The motion for holding the competition was carried by 6 votes to 1. Messrs. J. C. Gibson, W. H. Watson and F. Greaves, Agriculural Instructor, were appointed as Judges, the former being the Convener of the Committee.

Other minor matters were considered and the meeting adjourned.

BOTANICAL IDENTIFICATIONS OF BRITISH GUIANA TREES AND PLANTS.

Continued from Page 106.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918
	LAURACEAE,—	Continued.		
127	Waramia	Kamuni R., Dem. R.	Tree, up to about 14" dia., grows mostly in mainap. Soft, light brown wood with soft heart, said to be not lasting. Fruit said to be an edible berry.	*Ocotea Schomburgkiana*, Mez.
274	Determa (or Tetruma.)	Kara-kara ck., Dem. R.	Tree	(Lauraceae).
	LOBELIACEAE			
213	Nameless shrub	— N.W.D.	Shrub bordering river banks. Vermilion flowers.	*Centropogon surinamensis*, Presl.
	LICHEN			
?	Nameless	Kara-kara ck., Dem. R.	Lichen growing mostly on ants (termites), nests on Savan; red flowers.	*Cladonia corallifera* (Kunze.), Nyl.
	MONIMIACEAE			
220	Munuri-dang	Issororo Hill, N.W.D.	Small tree, about 2½ dia. and 15 ft. high Medium hard, white wood. Fruit and leaves said to have odour of Munuri ants, hence the name.	*Siparuna guianensis* Aubl.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918.
	MYRISTICACEAE.			
38	Dalli or Wild nutmeg.	Aruka, N,W.D.; Issororo, Pom. R. and Fort Island, Esse. R.	Large tree, found mostly in swamp Light brownish-yellow wood; boards used for rough work, not durable. Seeds contain 60.53 per cent, of fat which resembles cocoa butter.	*Myristica surinamensis*, Roll. (=*Virola surinamensis*, Wart.)
279	Kilikowa or Hill Dalli	Kara-kara ck. Dem. R.	Tree	*Myristica macrophylla*, Benth.
	ORCHIDEAE.—	(Monocotyledon.)		
71	Vanilla	Amakura R. N.W.D.	A vine, plentiful	*Vanilla Pompona*, (Schiede, and *grandiflora*, Lindl.). Fruit and note on colour of flower would probably settle the determination
211	do	Kaitum R., N.W.D.	A vine	*Vanilla inodora*, Schiede
212	Orchid	do. do.	—	*Ionopsis paniculata*, Lindl.
234	do.	Anabisi Savan:, N.W.D,	Small white flowers, yellow centre	*Epidendrum* § *Amphiglutttürm Schistochila carinata*, (complete specimen desired).
78	Aquatic plant, (Orchid ?)	Waiuma, Yarikita R., N.W.D	Small aquatic plant, plentiful; yellow flowers standing upright on stalk clear of water.	*Habenaria longicauda*, Hook,
511	Nameless plant	Kara-kara ck., Dem. R.	Plant from Savan:	*Habenaria*=Jenman 1881, near *H. Leprieri*, Reichb. f.
	NYCTAGINACEAE.			
392	Mafo (Mapho)	Orealla-Warleigh Courantyne R.	Tree; soft, light wood light, brownish-yellow colour, Flower small, greenish Fruit pale yellow to pink.	*Pisonia pacurero*, H B.K.
393	Nameless tree.	Tarakuli ck., Courantyne R.	Small tree with red fruit.	*Pisonia graciliflora*, Mart?

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918
	POLYGONACEAE			
364	Long John (or Kada-burichi.)	Georgetown, Dem.	Tree.	*Triplaris surinamensis*, Cham.
	ROSACEAE.			
460	Kauta.	Christianburg, Dem. R.	Tree. Pale yellow flowers	*Moquilea pallida*; Hook. f.
14	Kauta-balli	do. do.	Large tree, squares over 12"; wood hard, dark reddish-brown, close-grained; burns readily even when green, hence called "Candle wood."	*Licania mollis*, Benth.
39	Kairi-balli (Kairu-balli), Hill variety	Amakura R. N.W.D.	Tree, grows to about 21" dia.; wood hard, dark reddish-brown close-grained. Bark exudes red resin. Infusion of bark boiled used for diarrhœa and gonorrhœa. Roots above ground.	*Licania heteromorpha*, Bth.
456	Arua-danni or Muri Kauta-balli.	Christianburg, Dem. R.	A spreading tree.	*Licania sp.* (flowers required.)
57	Burada.	Amakura R., N.W.D.	Large tree, squares about 18." Hard close-grained, red-brown wood, heart ill-defined. Used for house building.	*Licania Kunthiana*, Hook f.
325	Buhurada.	Kabakaburi, Pom. R.	Tree, different to No. 57.	*Parinarium campestre*, Aubl.
314	Nameless Tree.	Kabakaburi, Pom. R.	Small tree. Flowers in long spikes, green sepals, white petalls, purple stamens	*Hirtella americana*. L.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918
	RAPATEACEAE.	(Monocotyledon).		
253	Nameless aquatic grass or plant.	Pokorero, Kamuni, Dem. R.	Aquatic grass.	*Rapatea paludosa.* Aubl.
	RHIZOPHORACEAE			
262	Nameless tree.	Arawari R., Essè. R.	A small tree, has latex. From sand beach.	*Cassipourea macrophylla,* D.C., var.
	RUBIACEAE.			
47	Kamadan.	Amakura R., N.W.D. Bonasika R., Esse. R. Fort Island. Ess. R.	Small tree, conspicuous on river bank. White fragrant flowers, in sprays; large yellow fruit, said to be edible.	*Posoqueria Trinitatis,* D.C.
148	Kama-danni.	Mahabadin R., Dem. R.	Small tree, up to 12" dia. Mostly found on Savan. lands. Hardwood; Sapwood brown, with ill-defined dark, reddish-brown heart. Same as No. 297.	*Palicourea guianensis,* Aubl.
297	Nameless tree.	H.M.P. Settlement. Maz. R.	Small tree from mainap. Same as No. 148	*Palicourea guianensis,* Aubl,
266	Nameless shrub.	Supenaam R. Esse. R	Shrub with red flowers.	*Palicourea riparia* Benh.
290	Nameless tree.	Anabisi, N.W.D	Small tree growing near river and swamp Savan. lands. Red flowers.	*Palicourea riparia,* Benth.
24	Kaia-kaia-danni	Kamuni R., Dem. R.	Small tree.	*Retiniphyllum Schomburgkii,* Benth.
191	Nameless tree.	Kaituma R., N. W.D.	Small tree growing on river banks. Has latex	*Cosmibuena triflora* Benth.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918.
	RUBIAÇEAE Continued.			
249	Kurara-balli	Kamuni R., Dem. R.	Small tree, 4" dia :	*Ixora Schomburgkiana*, Benth.
72	Aku-owmu or Kill Cow bird's foot	Issororo, Aruka, N W.D.	A shrub.	*Psychotria racemosa*, Willd.
225	Nameless shrub.	Bonasika R., Esse. R.	A shrub.	*Sipanea pratensis*, Aubl.
319	do. do.	Ariah Pom R.	A shrub with bright red flowers. Common on river banks and openings, mainap, &c.	*Cephaelis tomentosa* Willd,
226	Nameless climber	Bonasika R., Esse. R.	A climber.	*Cephaelis violacea* Willd.
328	Bird seed	Anna Regina water path, Esse.	A shrub. White flowers like Jasmin	*Randia mussaenda*, D.C.
378	Nameless shrub	—Upper Pom. R.	Shrub growing on river bank.	*Gonzalea spicata*, D.C., var. *dicocca*, K. Sch.
413	do. do.	Cow Falls, Courantyne R.	A shrub growing on rocks.	*Diodia articulata*, D.C.
204	Nameless vine	Anabisi, Kaituma R., N.W.D.	A liane from river bank.	*Schradera polycephala*, D.C.
206	Nameless climber	Kaituma R., N.W.D.	A crawler ; from river bank.	*Hillia s.p.*=Jenman 2032.
63	Kumara-mara or Maru-mara.	Kwara Itabo, Aruka, N.W.D.	A tree, grows to over 7" dia. Very hard, close-grained, light brown wood. Fruit edible.	*Duroia sp.* ?
152	Ruku-ruku	Kamuni R., Dem. R.	A tree; soft; pale to bright yellow wood. Thick bark yields white latex which dries into a pale brown, brittle gum. Fruit large, has sweet, edible syrup.	(Rubiaceae ?)

D.L.M. Record No.	Vernacular name	Where Collected	Description	Final determination at Kew from lists supplied in 1918
	SAPOTACEAE			
(Melville No. 18)	Balata	Rupununi District?	—	c.f. *Achras sapota*, L.
9	Black Balata	Mamura Hill, Aruka River, N.W.D.	Large tree, dark red wood. Leaves fruit and wood resemble true Balata. Yields abundance of latex which is often mixed with Balata milk and boiled.	*Mimusops elata*, Allem.
198	Nameless tree	Anabisi, Itabo, Kaituma, N.W.D.	Forest tree, has a little latex. Bright yellow flowers.	*Sideroxylon cuspidatum*, D.C., var. *ellipticum*.
171 } 465 }	Vogel Kop, Fogel Kop or Kudibutshi	H.M.P. Settlement, Esse. Kara-kara ck., Dem. R.	Tree, pale yellow, hard wood. Has slimy white latex.	*Sideroxylon sp.* (Note: See also No. 452, under Anonaceae-*Guatteria Schomburgkiana*).
367	Assapoko	Kaituma R., N.W.D.	Tree. Hard, fine-grained, yellowish-brown wood. Has a sticky white latex which dries like Balata. Fruit edible.	*Lucuma sp?*
240	Barata	Kamuni R., Dem. R.	Small tree 4" dia. Fruit a pinkish edible berry.	*Lucuma sp?*
386	Sororo-borieng or Male Bullet Tree, also called Kokeriti-balli	Issororo, Aruka, N.W.D.	Tree; hard, reddish wood; small, red heat	*Lucuma sp.?*
430	Kokeriti-balli	Manabadin, Dem. R.	Tree. Hard bark variety.	(Sapotaceae).
	SCITAMINEAE			
336	Nameless.	Makasima, Pom. R.	Tree on river bank. Red flowers and stems.	*Alpinia speciosa*, K. Schum
291	Mukru or Iturichi	Bonasika R., Esse. R.	A reed, used for basket making by Indians and others.	*Ischnosiphon obliquus*, Kcke.

D.L.M. Record No.	Vernacular Name	Where Collected.	Description.	Final determination at Kew from lists supplied in 1918
	SOLANACEAE			
306	Nameless.	Wolga, Esse. R.	Small tree or shrub. From mainap,	*Solanum foetidum*, Ruiz. et Pav.
	URTICACEAE			
406	Letter wood, Burokoro or Snake wood.	Manakobi, Courantyne R.	Tree; hard, dark, red-brown wood with black marking supposed to resemble letters, Flowers green ish yellow with brown anthers, irregular shape.	*Brosimum Aubletii*, Poepp. et Endl., var
137	Tibikushi or Bastard Letter wood.	Kamani R., Dem, R,	Tree, grows on sand hills. Hard, yellowish-brown Sapwood, small, dark red heartwood. The latter used by the Indians for making bows. Has stricky white latex	*Brosimum Aubletii* Poepp. et Endl., var
467	do — do.—	Komantin. Wiruni, Ber. R	Tree, differs from No. 137.	*Brosimum Aubletii* Poepp. et Endl.
281	Babura-balli or Ruri	Komantin Savan: on Kara-kara path, Dem. R.	Tree, large.	*Brosimum sp.*
331	Fig tree.	Suddie coast, Esse.	Small tree with latex.	*Ficus angustifolia*, Miq.
	Kumaka-balli.	Hioaina hill, Aruka R. N.W.D.	Large tree with broad leaves, ove. 2ft. dia. Wood soft and fibrous. Has sticky latex which is used by Indians in a plaster for sprains,	*Ficus sp.*, (not matched.)
1°8	do.—	Kaituma R N.W.D.	Tree, (Specimens have apparently got mixed vide No. 461	*Coussapoa microcephala*, Tree.

D.L.M. Record No.	Vernacular Name	Where Collected	Description	Final determination at Kew from lists supplied in 1918.
	URTICACEAE—Continued.			
461	Yele	Kara-kara ck., Dem. R.	A straggler, rope-like in growth, from creek banks, (Specimens have apparently got mixed vide No. 188).	*Couassapoa microcephala*, Tréc.
475	Sukune	Christianburg, Dem. R.	Tree, soft, medium heavy wood.	*Helicostylis Poeppigiana*, Tréc.
459	Buruma	Kara-kara Ck., Dem. R.	Tree 17 ft. high; lower half solid, upper hollow. Soft wood.	*Pouroumа* c.f. *P. guyanensis*, Aubl.
115	Wanasoro, Congo Pump or Trumpet Tree	Mt. Terminus, N.W.D.; Bonasika R., Esse. R.	Mainap tree; very soft, white wood.	*Cecropia peltata, L.?*
172	Wanasoro or Float wood	H.M.P. Settlement, Maz. R.	Mainap Tree, very soft, white, fibrous wood. Different to No. 115, in leaves, stem and bark.	*Cecropia Juranyana alad.* Richt.
96	Cow tree	Kaituma Falls, N.W.D.	Tree with latex.	(Urticaceae).
	VERBENACEAE.			
270	Petraea	Bonasika R., Esse. R.	A vine. Flowers same as No. 93. Blue Flowers.	*Petraea Schomburgkiana*, Schauer.
93	do.	Fort Island, Esse- R.	Sand paper vine. Leaves rough and used as a substitute for sand paper. Same as No 270?	*Petraea sp.*
	XYRIDEAE.			
195	Nameless	Anabisi, Kaituma R., N.W.D.	Aquatic plant.	*Xyris sp.*, (leaves required.)

EXPORTS OF AGRICULTURAL AND FOREST PRODUCTS.

Below will be found a list of the Agricultural and Forest Products of the Colony exported up to the end of September, 1918. The corresponding figures of the two previous years, and the average for the four years previous to that, are added for convenience of comparison.

Product.	*Average 1912-15.*	*1916.*	*1917.*	*1918.*
Sugar, tons ...	46,172	51,798	73,507	64,427
Rum, gallons ...	2,017,446	3,136,192	2,736,829	2,016,173
Molasses, gallons...	62,519	...	87,140	28,186
Cattle-food, tons ...	2,727	522	1,825	1,876
Cacao, cwts. ...	337	224	70	85
Citrate of Lime, cwts.	38	405	129	27
Lime Juice, gals....	....	5,703	10,727	11,390
Essential Oil of Limes, gals.	....	241	219	162
Coconuts, thousands	1,132	1,130	1,523	824
Coconut Oil, gals....	*	*	20,986	23,112
Copra, cwts. ..	1,125	1,130	817	2,010
Coffee, cwts. ...	1,405	4,075	2,273	2,924
Kola-nuts, cwts. ...	2	21	...	24
Rice, tons ...	4,938	10,353	12,674	7,963
Ricemeal, tons ...	883	250	140	66
Cattle, head ...	630	504	723	306
Hides, No. ...	3,401	3,943	1,281	2,263
Pigs, No. ...	1,031	920	455	nil.
Sheep, head ...	54	27	18	10
Balata, cwts. ...	6,594	6,714	5,932	3,628
Charcoal, bags ...	47,962	43,249	34,708	29,054
Firewood, Wallaba, etc., tons ...	7,096	8,349	6,274	5,233
Gums, lbs. ...	1,360	883	112	60
Lumber, cub. ft. ...	239,244	281,630	123,125	92,530
Railway sleepers, No.	4,486	4,325	30,013	6,510
Rubber, cwts ...	7	110	96	142
Shingles, thousands	1,711	1,672	2,172	2,009
Timber, cub. ft. ...	227,932	120,354	24,992	8,026

* No records available.

ATTENDANCES AT THE DISTRICT GARDENS.

YEAR.	Bourda.	Belfield, E. Coast.	Stanleytown, New Amsterdam.	Suddie, Essequibo.	Den Amstel.	Houston, E. Bank.	Wakenaam.	Total Attendances.
1912 ...	5,514	4,395	3,302	2,100	2,544	2,156	,718	21,729
1913 ...	5,156	4,535	2,519	3,399	2,568	1,836	1,319	21,332
1914 ...	4,243	3,869	2,443	3,025	1,791	1,653	1,533	18,577
1915 ...	1,123	1,006	769	59	503	339	401	4,200
1916 ...	4,705	1,161	1,510	225	623	2,251	1,297	12,026
1917 ...	4,991	2,820	1,366	3,297	1,186	2,564	1,663	17,88
1918 1st Quarter	1,085	812	397	1,013	409	684	518	4,91
2nd Quarter	1,110	554	427	727	526	609	529	4,48
3rd Quarter	1,285	794	498	702	9	796	376	5,01

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